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DOES CURRENT SUPPRESSION OF ENEMY AIR DEFENSES  
DOCTRINE SUPPORT AIR MANEUVER?

A thesis presented to the Faculty of the U.S. Army  
Command and General Staff College in partial  
fulfillment of the requirements for the  
degree

MASTER OF MILITARY ART AND SCIENCE

by

PETER E. CURRY, CPT (P), USA  
B.S., Frostburg State College, Frostburg, Maryland, 1983



Fort Leavenworth, Kansas  
1994

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Does Current Suppression of Enemy Air  
Defenses (SEAD) Doctrine Support Air  
Maneuver?

CPT Peter E. Curry, USA

U.S. Army Command and General Staff College  
ATTN: ATZL-SWD-GD  
Fort Leavenworth, Kansas 66027-6900

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This study investigates the effectiveness of current Suppression of Enemy Air Defenses (SEAD) doctrine in relation to U.S. Army doctrine of air maneuver. The thesis' main focus is Corps and Division level SEAD operations in support of helicopters. Currently in Army doctrine, there is not a wide breadth of information concerning air maneuver. This is beginning to change. This study identifies key maneuver concepts that can apply to air maneuver. As air maneuver doctrine evolves, SEAD doctrine must also change to meet the new requirements that air maneuver brings to the battlefield. By using three case requirements: Operations LAM SON 710, Urgent Fury, and Desert Storm, this study identifies SEAD requirements. These studies show that the firepower-only SEAD solution that the Army currently employs is inadequate. The most effective anti-helicopter weapons are difficult to target, causing shortcomings in the Army's fire support approach. Finally, this study concludes that the Army needs a broader approach to SEAD rather than relying solely on fire support. It needs closer integration of air maneuver into the overall plan, better command and control, different equipment, as well as a more prudent use of all fire support assets.

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Suppression of Enemy Air Defenses (SEAD), Air Maneuver,  
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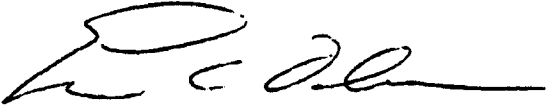
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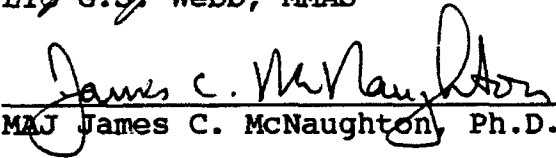
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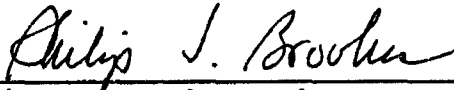
Approved by:

  
\_\_\_\_\_, Thesis Committee Chairman  
LTC Eric C. Olsen, M.S.

  
\_\_\_\_\_, Member  
LTC G.S. Webb, MMAS

  
\_\_\_\_\_, Member, Consulting Faculty  
MAJ James C. McNaughton, Ph.D.

Accepted this 3rd day of June 1994 by:

  
\_\_\_\_\_, Director, Graduate Degree  
Philip J. Brookes, Ph.D. Programs

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

DOES CURRENT SUPPRESSION OF ENEMY AIR DEFENSES (SEAD)  
DOCTRINE SUPPORT AIR MANEUVER? by CPT (P) Peter E. Curry,  
USA, 151 pages.

This study investigates the effectiveness of current Suppression of Enemy Air Defenses (SEAD) doctrine in relation to U.S. Army doctrine of air maneuver. The thesis' main focus is Corp and Division level SEAD operations in support of helicopters.

Currently in Army doctrine, there is not a wide breadth of information concerning air maneuver. This is beginning to change. This study identifies key maneuver concepts that can apply to air maneuver. As air maneuver doctrine evolves, SEAD doctrine must also change to meet the new requirements that air maneuver brings to the battlefield.

By using three case studies: Operations LAM SON 719, Urgent Fury, and Desert Storm, this study identifies SEAD requirements. These studies show that the firepower-only SEAD solution that the Army currently employs is inadequate. The most effective anti-helicopter weapons are difficult to target, causing shortcomings in the Army's fire support approach.

Finally, this study concludes that the Army needs a broader approach to SEAD rather than relying solely on fire support. It needs closer integration of air maneuver into the overall plan, better command and control, different equipment, as well as a more prudent use of all fire support assets.

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## LIST OF ABBREVIATIONS

AAA	Anti-Aircraft Artillery
AGM	Attack Guidance Matrix
ARVN	Army of the Republic of Vietnam
ATO	Air Tasking Order
A <sup>2</sup> A <sup>2</sup>	Army Airspace Command and Control
D3	Decide, Detect, and Deliver
ECM	Electronic Countermeasures
EW	Electronic Warfare
FM	Field Manual
HPTL	High Payoff Target List
JFACC	Joint Force Air Component Commander
J-SEAD	Joint Suppression of Enemy Defenses
KTO	Kuwait Theater of Operations
LOS	Line-of-Sight
LZ	Landing Zone
MAU	Marine Amphibious Unit
MEB	Marine Expeditionary Brigade
mm	millimeter
NVA	North Vietnamese Army
PGM	Precision Guided Munitions
PRA	People's Revolutionary Army
PZ	Pick-up Zone

SAM	Surface-to-Air Missile
SEAD	Suppresion of Enemy Air Defenses
SHORAD	Short-Range Air Defense
TF	Task Force
USAF	United States Air Force

## CHAPTER 1

### INTRODUCTION

#### The Research Question

Does current Suppression of Enemy Air Defense (SEAD) doctrine support U.S. Army air maneuver doctrine at Corps and Division level?

#### The Subordinate Questions

What are the SEAD requirements for air maneuver? What impact, if any, does air maneuver have on Joint Suppression of Enemy Air Defenses (J-SEAD) doctrine?

#### Background

The U.S. Army's evolving aviation doctrine has changed the role of combat helicopters. Before the war in Vietnam, airmobility or airmobile operations was the movement of troops and their supplies from one place to another on the battlefield. The Army usually relegated aviation units to a combat support role. While integrated somewhat into the operational plan, the helicopter was simply a vehicle for mobility.

In Vietnam, the development of armed helicopters and troop-carrying helicopters changed the concept of

airmobility. Newly designed organizations, called air cavalry, had troop-carrying helicopters, helicopter gunships, aerial rocket artillery helicopters, and specially-trained infantry. As this organization matured, army commanders regarded this force as essential to their mission accomplishment and used it in most major operations.

#### The Change from Helicopter Combat Support to Air Maneuver

Post-Vietnam Army planners began to expand the ideas of independent heliborne operations. It considered employing heliborne forces as a maneuver force similar to the infantry and armor.

Army aviation doctrine changed because of the lessons of air cavalry squadrons in the Vietnam war. The current Aviation Brigade structure is a direct descendant of these changes. Originally designed as combat support for ground units, today's helicopter outfits are doctrinally employed as maneuver elements.

Air maneuver is "to place the enemy in a position of disadvantage through the flexible application of combat power in the third dimension."<sup>1</sup> This represents a doctrinal change. Aviation no longer simply provides support for ground maneuver forces in order for them to gain leverage on the enemy. Aviation can be the lever itself. This doctrinal shift signals many changes, not only in force structure, but also in tactical thought. The Army's aviation employment

techniques may change support requirements for aviation operations. This discussion centers on one aspect of this change in support called SEAD operations.

Suppression of Enemy Air Defenses is "that activity which neutralizes, destroys, or temporarily degrades enemy air defenses in a specific area by physical attack and/or electronic warfare."<sup>2</sup>

### Air Defenses versus Helicopters

With the arrival of sophisticated battlefield air defense systems, particularly the explosive proliferation of SHORAD (short range air defense) systems, some scholars call into question the utility of combat helicopters in certain combat scenarios.<sup>3</sup> Since the late 1960's and early 1970's, when shoulder-fired, surface-to-air missiles (SAMS) and radar-guided, anti-aircraft artillery (AAA) appeared on the battlefield in large numbers, the tactical environment for combat helicopters has become more lethal.

SHORAD systems are the primary weapons systems used against helicopters. These systems can be broken down into four categories: SAMS, AAA, radar systems and fire direction systems, and small arms fires.

The development of SAMS has taken two routes: vehicle-mounted missile systems, and man-portable missiles. Man-portable missiles depend on the soldier acquiring an aircraft and firing, making him extremely vulnerable to fires

himself. Conversely, man-portable systems make detection of the gunner extremely difficult. A vehicle-mounted SAM usually is networked with radar systems. Therefore, it depends upon acquisition and tracking radars that provide the crew with early warning of incoming air attack.

There are some shortcomings to these systems. Effective countermeasures (such as chaff and flares) foil all but the most sophisticated systems. Additionally, most are line-of-sight (LOS) systems requiring clear, unobstructed fields of fire when engaging aircraft. Some systems, (especially the shoulder-fired ones), are optically-tracked only. This degrades their effectiveness in darkness and periods of limited visibility because target acquisition becomes more difficult. A missile's biggest drawback is that it has a minimum altitude for engaging aircraft. Helicopters using terrain flight techniques (very low to the earth, i.e., 50 feet above the ground or lower) can effectively limit these weapons' effects by using the earth's terrain to shield the aircraft from danger.

Terrain flight really differentiates fixed-wing jets from rotary-winged helicopters. A fixed-winged aircraft flies low and uses the terrain to mask it from enemy radars. However, its high speed prevents it from getting under most radar coverage and is eventually seen on enemy radar screens. These radars must be suppressed for the aircraft to survive.

Helicopters fly so low to the ground that they are lost in most ground clutter seen on enemy radar screens. Terrain flight lets the helicopter gain "cover." Cover is putting terrain between the shooter and the aircraft, preventing the shooter from engaging it. Because of this, most dedicated ADA systems are not as effective as one may think. In the future, radars may discriminate helicopters from ground clutter, but countries will develop new countermeasures. Either way, there are two different SEAD requirements based on aircraft capabilities.

To counter radar deficiencies, armies upgraded to larger caliber (20 mm and above) AAA gun systems. While having shorter ranges than missiles, guns have no minimum engagement altitudes. In fact, support of ground troops is a gun's secondary mission. AAA guns are primarily designed to protect ground maneuver forces against rotary-winged attack by covering the airspace under the SAM's minimum engagement altitudes. AAA weapons are also LOS systems. When mounted on vehicles, they move with mobile formations, offering mobile protection from air attack. When towed, they are usually placed in fixed and semi-fixed sites for point defense such as bridge crossings, key buildings and terrain features, or suspected helicopter landing zones. Most of these systems have radars for both acquisition and tracking, but they can fire independently, using only optical sights. Although gun systems do not have minimum engagement

altitudes, they have much shorter ranges than shoulder-fired SAMs, such as SA-7's, SA-14's, Blowpipe, or Stinger missiles. Hybrid SHORAD systems, such as the 2S6M "Tunguska" and the Avenger system, combine both guns and short-range SAMs on the same chassis.<sup>4</sup>

Air defense radars and fire direction systems come in two basic forms: Acquisition radars and tracking radars. Acquisition radars detect aircraft at long distances, providing early warning of incoming aircraft. They allow the fire direction centers the time to coordinate fires among the air defense batteries. These acquisition radars can allow firing batteries to remain electronically "hidden" by passing on an acquired "air picture" to other units in the area of operations. When the aircraft close with or enter ADA firing range, the batteries will use some or all of their systems' tracking radars. Tracking radars provide computerized ballistic solutions that tremendously increase the probability of hitting the helicopter in the initial phases of the engagement. The main drawback with any radar system is that each type also has a unique signature that can be identified almost immediately. Helicopters, using radar warning receivers, can immediately tell a radar by type and direction. Using these, aircrews know when they are being "painted" or tracked by radar. Crews can then avoid or strike the radars, thereby reducing radar effectiveness.



The last category of air defense is small arms or all arms defense. This includes all individual weapons, crew-served weapons, tanks, anti-tank systems, and artillery--any system that can possibly contribute to air defense. All-arms defense is most effective during defensive operations. It employs coordinated, rehearsed fires using "curtain fire," which saturates a section of sky with a hail of projectiles as the aircraft enters this airspace.

In the optimal air defense solution, units integrate ADA systems into a cohesive defense that prevents gaps in coverage. Acquisition radars detect targets far away from the ground force. These radars monitor the flight paths of incoming aircraft and allow the fire direction center operators to give firing instructions to the SAM batteries and early warning to the AAA units. The radars direct the gun and missile systems to be in the most advantageous position to open fire. On command, the batteries open with a swift, violent volley of fire that destroys the aircraft in short order. If the command and control of this system is disrupted in any way, it significantly decreases the air defender's chance of successful engagement.

Dedicated air defense systems, SAMs and AAA, have forced helicopters out of high altitudes where they were once safe from small arms. This, however, has caused aircrews to fly into the range where all arms can engage the aircraft.

## Joint Suppression of Enemy Air Defenses (J-SEAD)

The need for SEAD is so great that in 1991 the Joint Staff published JCS PUB 3.014 entitled, "JTTP for Joint Suppression of Enemy Air Defenses, (J-SEAD)," which establishes doctrinal guidelines for all U.S. Services.<sup>5</sup>

With the changing world order, our National Military Strategy is beginning to change doctrine. This strategy emphasizes regional conflicts involving multi-service participation.<sup>6</sup> Doctrinal solutions for helicopter operations must work well in joint operations. A review of Joint-Suppression of Enemy Air Defense doctrine helps create a seamless integration of all U.S. armed forces under a single commander.

### Assumptions

1. Combat helicopter units can apply a maneuver doctrine that is flexible enough to endure technological changes.
2. Air maneuver is more than just battlefield mobility. It requires responsive command and control to gain positional advantage on the enemy.
3. Establishing trends from historical data obtained from battlefield analysis and unit After-Action Reports (AARs) can develop optimum doctrinal SEAD solutions.

## Definitions

Campaign SEAD. This is the theater-wide plan to suppress the major integrated systems within the theater. The theater CINC (Commander in Chief) usually delegates the execution of the campaign SEAD effort to the Joint Force Air Component Commander (JFACC).<sup>7</sup> This study will not directly address this element of SEAD, except where it affects localized and complementary SEAD.

Complementary suppression. Sometimes called complementary SEAD, complementary suppression is concerned with suppressing targets of opportunity and aircraft self-defense. It is an unstructured activity to degrade enemy air defenses. The level of dedicated effort is controlled by the prioritization of Army fires within designated geographic areas. Army complementary suppression usually occurs at the Division and below. For this work, complementary suppression and complementary SEAD are synonymous.<sup>8</sup>

Localized SEAD. These operations are preplanned, usually focused at the Corps level and above. These operations are confined to a geographic area by protecting the effectiveness of friendly combat air operations from enemy ground fires. Localized SEAD supports Close Air Support (CAS) and Army aviation operations and suppresses air defenses along established air corridors.<sup>9</sup>

Support means that timely suppression of enemy air defenses which occur in a preplanned or "on-call" situation.

Suppression is the use of any means, method, or weapon system that prevents the enemy force from accurately firing on aircraft. It may disrupt, delay, neutralize, or destroy enemy systems for the duration of the time that friendly aircraft are in firing range.

### Limitations

Much of the work in the area of SEAD is classified because of emerging computer technologies that are the basis for many air defense systems. However, this thesis uses many sources of unclassified work, making classified research unnecessary. The focus of this thesis is on ideas for planning purposes, not a narrow, head to head, analysis of air defense systems vs. helicopters.

Subjective historical analysis and the evaluation of current doctrinal models are limitations. Analyzing many conflicts reduces these limitations because they involve different forces, doctrines, and equipment, while fighting on widely differing terrain.

### Delimitations

This thesis studies only localized and complementary SEAD. A thorough discussion of campaign SEAD is omitted since most Army SEAD operations involve localized and complementary SEAD. The scope of this thesis is on major operations and not entire campaigns. This isolates solutions to the tactical problems faced by adversaries.

Operations to be studied are: the U.S. operations of Lam Son 719, Urgent Fury, and Desert Storm. These operations have value for accurate analysis. They were limited in scale with defined objectives and there is ample, unclassified research available.

#### Significance of Study

This study will expand on the current philosophy of Army aviation as an air maneuver element. New proposed ideas, if any, could contribute to the rewriting of field manuals.

This study hopes to clarify and codify the importance of the aviation commander and his staff's involvement in the SEAD planning and execution process. It should develop planning concepts and considerations.

#### The Thesis Road Map

From this point, the thesis moves into Chapter 2, "Literature Review." Its purpose is to review maneuver doctrine, air maneuver doctrine, and SEAD doctrine, to answer the following questions: What is maneuver? What is air maneuver? What is the state of Army SEAD doctrine? How does Army aviation work in the Joint arena?

Chapter 3 lays out the research methodology. This thesis takes a historical approach to how the Army employed aviation on the battlefields of Laos, Grenada, and Iraq.

Several areas are analyzed to establish trends contributing to helicopter losses.

Chapter 4 uses the methodology to explore Operation Lam Son 719. Chapter 5 analyzes Operation Urgent Fury, while Chapter 6 examines Operation Desert Storm.

Chapter 7 answers the research question and the major subordinate questions listed in Chapter 1. It also offers some recommendations on the relationship between SEAD doctrine and air maneuver.

## ENDNOTES

<sup>1</sup>U.S. Army Warfighting Center, "Aviation Warfighting Treatise" (Fort Rucker, AL: U.S. Army Warfighting Center, 1993), 6.

<sup>2</sup>The Joint Chiefs of Staff, Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms (Washington, D.C., The Joint Chiefs of Staff, 1989), 355.

<sup>3</sup>Kenneth P. Werrell, Archie, Flak, AAA, and SAM, (Maxwell Air Force Base, AL: Air University Press, 1988), 115.

<sup>4</sup>Monch Publishing Group, "2S6M Tunguska: The world's first gun/missile SP AA system", Military Technology, (July 1993), 38 and Robert Ropelewski, "US air defenses for the next century", Interavia, (April 1993), 72.

<sup>5</sup>The Joint Chiefs of Staff, Joint Pub 3-01.4, JTTP for Joint Suppression of Enemy Air Defenses (J-SEAD), (Washington: The Joint Chiefs of Staff, 1993), iii.

<sup>6</sup>The Joint Chiefs of Staff, JCS Pub 3-0, Doctrine for Unified and Joint Operations, Test Publication, (Washington: The Joint Chiefs of Staff, 1990), I-3.

<sup>7</sup>U.S. Army, FM 6-20-30, B-36.

<sup>8</sup>U.S. Army, FM 6-20-30, B-37.

<sup>9</sup>U.S. Army, FM 6-20-30, Tactics, Techniques, and Procedures for Fire Support for Corps and Division Operations (Washington: Department of the Army, 1989), B-36.

## CHAPTER 2

### LITERATURE REVIEW

With the emergence of U.S. Army air maneuver doctrine, current SEAD doctrine needs review. Is SEAD doctrine still valid? Does air maneuver doctrine change the way the Army views SEAD? Air maneuver doctrine and SEAD must merge effectively together on the battlefield. Does this merging of these two ideas occur or does air maneuver create a hole in current doctrine? To answer these questions, this thesis begins with an overview of some major works in maneuver theory followed by a review of air maneuver doctrine. Then this thesis examines SEAD doctrine to find any synthesis between air maneuver and SEAD.

#### What is maneuver?

To understand air maneuver, one must know maneuver warfare doctrine. Former Chairman of the Joint Chiefs of Staff, General Colin Powell, signed a Joint Doctrinal statement that succinctly describes the basis for maneuver.

The principle purpose of maneuver is to gain positional advantage to the enemy centers of gravity in order to control or destroy these centers of gravity. The focus of . . . maneuver is to render the enemy incapable of resisting by shattering their morale and physical cohesion . . . rather than to destroy them physically through attrition.<sup>1</sup>



This definition is widely accepted as the definition for maneuver warfare, but there is more to the theory.

No discussion of maneuver warfare can begin without reviewing a few cornerstone works in the field. B.H. Liddell Hart's book, Strategy, emphasizes combined arms warfare and what he calls the "indirect approach." Hart's key strength is that the basic maneuver concepts or axioms do not change even in the face of vast, sweeping, technological change. It is not a work on the particulars of military operations, but is concerned with the thought processes that arrive at suitable solutions.<sup>2</sup>

Central to Hart's ideas is the concept of the indirect approach. Pitting friendly strength against the weaknesses of the enemy is the heart of the indirect approach. By ruthlessly exploiting weakness, the maneuver force gains positional advantage on the enemy. The maneuver force creates a dilemma for the enemy. It forces the enemy to abandon any strong positions or risk destruction.

William S. Lind defines these basic maneuver concepts well in his Maneuver Warfare Handbook. He describes three filters that all maneuver operations must go through: (1) mission-type orders, (2) the concept of gaps and surfaces, and (3) the concept of Schwerpunkt, loosely known as the main effort.<sup>3</sup> Some of these concepts can be useful when planning SEAD operations.

Mission-type orders are designed for decentralized control. Warfare is confusing; decisions should be made by the leader on the spot. This is the heart and soul of mission-type orders. The mission, or task is the overarching concern. It is up to the subordinate to make decisions that may affect the plan's outcome.<sup>4</sup> The U.S. Army, doctrinally at least, accepts this notion. It emphasizes centralized planning and decentralized execution.<sup>5</sup>

Commander's intent maintains battlefield order. Commander's intent is the glue, the harmonizing element, which describes how the force as a whole completes the mission and what the desired end state (output) is of mission accomplishment. Armed with this intent, the subordinate executes the mission. During combat, when communications with the higher headquarters breaks down, the commander expects the subordinate to achieve the task by the most suitable means available. How the subordinate accomplishes this is supposed to be up to him.<sup>6</sup>

Blended with the intent is the idea of surfaces and gaps. A gap is a weak point or a weakness of the enemy while a surface is the strength of the enemy. In maneuver warfare, the decentralized subordinate finds the gaps and exploits them while simultaneously avoiding the surfaces. This is analogous to Hart's indirect approach. When a gap cannot be found, the maneuver force creates one. Creating a gap, however, is less desirable than finding a gap.

To find the gap, units need timely reconnaissance at all levels. In maneuver theory, organic units do the reconnaissance. This type of mission does not require the unique talents of specialized reconnaissance outfits. All maneuver units constantly seek the gaps. Units performing reconnaissance duties "pull" the rest of the unit or its main body through the gap.

Lind's last filter is the Schwerpunkt or main effort. The commander designates one unit as the main effort at any given time in the battle. All other units are supporting efforts, designed to make the main effort successful. The commander expects the main effort to accomplish key elements of the mission. When battlefield conditions change, the commander shifts the main effort to maintain flexibility.

#### What is air maneuver?

Military theorist Richard Simpkin has his own views of maneuver warfare theory:

At root maneuver theory has nothing to do with vast numbers of men and machines charging about the countryside. Maneuver theory is about amplifying the force which a small mass is capable of exerting; it is synonymous with the indirect approach.<sup>7</sup>

This mass, once it gains positional advantage on the enemy, renders the enemy irrelevant to friendly operations. Supporting efforts deal with reducing confused enemy resistance. Destroying enemy forces is not the ultimate goal of maneuver warfare. Destruction for destruction's sake

wastes time and resources. The real aim is to shatter the enemy's cohesion and his will to fight. Contrary to maneuver warfare criticism, maneuver warfare does not fight clean, bloodless battles, but it fights a focused, violently concentrated campaign to shatter the enemy.

So how does air maneuver fit into this picture? Simpkin says that actual fighting is but one means to destroy the enemy. Borrowing from physics, he believes that a highly mobile force can deliver firepower quickly and gives the maneuver force very high potential energy and potential momentum. Potential is the maneuver force's greatest subset of total combat worth. Potential energy forces the enemy to defend against this force, usually causing the enemy to overextend. Overextension creates gaps ripe for exploitation.

Think of this football analogy. Most successful football teams have both good running and passing offenses. If the defense overplays the run, the offense passes the ball. A successful passing game forces the defense to play the whole field; it can not favor either the run or pass. Similarly, a unit with great potential energy makes the enemy use up great resources to defend against this threat that can strike quickly in many areas of the battlefield. Simpkin sees "airmechanized" or heliborne units as the optimum force to create momentum.<sup>8</sup>

Heliborne maneuver units are ideally suited to exploit weakness by using Hart's indirect approach. Using the helicopter's speed, agility, and momentum, units gain a tremendous positional advantage quickly. Together with mission-type orders aimed at finding gaps, these units can exploit the enemy through air maneuver.

#### U.S. Army Air Maneuver

The U.S. Army embraced the idea of air maneuver, espoused by Simpkin and others, and made considerable investments in its rotary-wing inventory. Now the Army is caught in a doctrinal shift. It abandoned the idea that heliborne forces are merely combat support, but it has not clearly identified aviation's role as a maneuver force to the Army community.

A current school of thought on air maneuver is beginning to emerge in many U.S. Army's publications. The June 1993 version of FM 100-5, Army Operations, sets into motion the idea of a commander's four-dimensional (length, width, height, and time) battlefield.<sup>9</sup> This salient work is the catalyst for probable rewriting of several manuals, including most of the aviation-series publications.

Since the Army rewrote its manual, it is necessary to review current doctrine. Doctrinally, Army Aviation's role on the battlefield is confusing and contradictory at best. Depending on the aviation unit, it can perform combat, combat

support or arguably, combat service support missions, giving aviation tremendous versatility. Versatility breeds confusion. As a result, other branches within the Army offer a myriad of opinions on aviation employment in their doctrinal manuals, most likely due to Army Aviation's inability to clearly identify their maneuver role on the battlefield. Consequently, many branches cannot fully identify their support requirements for air maneuver.

This uncertainty is seen in Army field manuals (FM). FM 100-15, Corps Operations, says that the aviation brigade "is not a maneuver brigade in the traditional sense." It is only maneuver in certain situations, for short times, and when augmented.<sup>10</sup> Going one echelon lower, FM 71-100, Division Operations, gives similar caveats for aviation as a maneuver element.<sup>11</sup> Searching yet one level lower, FM 71-3, Armored and Mechanized Infantry Brigade, states that aviation is "a maneuver element that normally attacks on a separate axis."<sup>12</sup>

Interestingly, the fire support manual for brigades, FM 6-20-40, Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Heavy), has its own ideas of aviation. "The organization and equipment of combat aviation units enable them to do several key fire support tasks."<sup>13</sup> So is aviation fire support or maneuver? One manual, FM 7-98, Operations in a Low-Intensity Conflict, compromises by saying, "Attack helicopters are highly mobile and immediate

response maneuver element that can attack targets anywhere on the battlefield by fire."<sup>14</sup>

This distinction between fire support and maneuver is important. The key issue is command and control. If aviation is a combat support element, then control rests with the supported commander. The aviation commander is a supplier of assets. If aviation is maneuver, then the aviation commander has a mission, aimed at gaining an advantageous position over an enemy unit. Aviation would receive support, not provide it.

Also the concept of fire support is focused on firepower. This is almost the opposite of maneuver doctrine. Firepower aims at destroying the enemy through attrition. Maneuver uses firepower to gain positional advantage on the enemy. Firepower becomes a tool that facilitates movement. It is a means to an end, not the end itself.

Current efforts from the aviation branch are trying to eliminate the uncertainty about what an aviation unit does on the battlefield.<sup>15</sup> When the Aviation branch successfully solves the problem, the Army should have a better understanding of aviation's roles. This thesis could help in establishing that vision.

#### The State of Army SEAD Doctrine

This discussion focuses on SEAD doctrine by reviewing the existing field manuals and Tactics, Techniques, and

Procedures (TTP) used by the U.S. Army. This gives insight to how SEAD is trained and executed. Finally, this thesis reviews Joint Publications for its impact.

Regarding Suppression of Enemy Air Defenses, there are few manuals focused at the localized and complementary level. Several Army manuals weave SEAD loosely throughout the works. The FM 6-series (Fire Support and Field Artillery) mostly give a cursory overview of SEAD operations. Most of the SEAD discussion centers on how to deal with large enemy formations that can be targeted. This places a great deal of emphasis on accurate intelligence and preplanned fires. It considers both lethal and non-lethal fires for suppression.<sup>16</sup> Usually complementary SEAD is not discussed beyond its definition, because it is very fluid and dependent on the battlefield situation.

Overall, the Army's position on SEAD is also confusing. Most manuals state the need for SEAD in Army aviation operations. The Army's basic fire support manual for the Corps and Division, FM 6-20-30, Tactics, Techniques, and Procedures for Fire Support for Corps and Divisions, says that the basic principle is "see-kill." If a unit can locate an air defense system (see), then the unit should kill it. This principle also defines complementary SEAD.

The problem seems to be in the approach to SEAD. Some publications view SEAD as strictly an application of properly allocating specific resources to engage or reduce particular



targets. This is the "tool box" approach. This approach emphasizes using the right tool (field artillery, maneuver forces, tactics etc.,) for the job at hand (SEAD). FM 71-101, Infantry, Airborne, and Air Assault Operations discusses tactics as a SEAD tool by suggesting proper aircraft altitudes and flight paths.<sup>17</sup> FM 1-100, Doctrinal Principles for Army Aviation in Combat Operations, takes the tool box approach a step further by saying that all assets need proper synchronization to be effective. A unit accomplishes SEAD by using "attack helicopters, ground attack weapons systems, fire support assets, joint or combined assets, and EW assets (which) should be synchronized."<sup>18</sup> No general thesis on SEAD is put forward in aviation's capstone document.

Not surprisingly, other aviation publications follow suit. To the Army SEAD is a product of fire support. FM 1-111, Aviation Brigades, clearly shows SEAD as a part of fire support operations.<sup>19</sup> FM 1-112, Tactics, Techniques and Procedures for the Attack Helicopter Battalion, states that "As a part of its mission, the ATKHB (Attack Helicopter Battalion) will also conduct SEAD operations," implying that it provides its own fire support.<sup>20</sup> FM 1-113, Assault Helicopter Battalion notes "...the AHB (Assault Helicopter Battalion) requires specific fire support in the form of J-SEAD. J-SEAD can be provided either by the USAF, mortars, FA, and EW (assets)."<sup>21</sup> This manual also discusses SEAD planning considerations stating that SEAD is planned for the

pickup zones (PZ's), landing zones (LZ's), and all along the route of flight.<sup>22</sup>

When the Army talks about SEAD, it is really talking about targeting air defenses. From there, corps and divisions deliver fires (artillery, CAS, and EW) on ADA sites to suppress them. The Army gives no real consideration for any other means to suppress enemy air defenses. Firepower alone is SEAD. FM 100-15, Corps Operations, states that, "Corps will have to take all possible steps to avoid, suppress, or destroy enemy air defense artillery and other counterair capabilities. This may include such measures as suppression of enemy air defense units, or systems with indirect fires, [and] jamming."<sup>23</sup>

The end of the Cold War creates more problems. The June 1993 release of FM 100-5 made changes, primarily because of the recent political upheavals occurring around the globe. In the new FM 100-5, the Army attempts to define its role in this new world. Any solutions to SEAD should fit this reality. If the Army has primarily a firepower solution to SEAD, then how does it handle "Operations other than War" where the restricted use of force is a prime consideration? The resultant changes to doctrine have not yet been published.

## Army Execution of SEAD

Combat Training Center (CTC) reports show that units do not plan SEAD well, if they plan at all. Its execution is even more disappointing. Aviation's battlefield role confusion translates into weak execution from the supporting arms. Possibly, the "tool box"/synchronization approach is useful but greatly limits SEAD execution.<sup>24</sup>

Currently, SEAD targeting starts with the Decide, Detect, and Deliver (D3) methodology.<sup>25</sup> It is the doctrinal foundation for responsive fire support. Working with the intelligence staff sections, the fire supporters decide what enemy units should be targeted. A High Value Target list (HVT) suggests what is important to the enemy commander's mission. The fire support element ranks the HVT into a High Payoff Target List (HPTL), which when attacked, makes the friendly commander's course of action successful. From this, the fire support coordinator develops an Attack Guidance Matrix (AGM) that aligns an attack system (artillery, EW, attack helicopters) to the target being attacked. During the detection phase, the intelligence cell coordinates elements or sensors to detect the chosen targets. The deliver phase occurs when the attack system attacks the target.

The D3 methodology depends on accurate intelligence, heavy amounts of firepower, and high resource expenditures, such as time and staff planning. Despite the doctrine of decentralized control, this method requires "top-down"

planning.<sup>26</sup> "Top-down" planning often translates into centralized control. Compounding this centralization is the Army's strict adherence to synchronization. "Synchronization of all fire support requires detailed planning and coordination and precise timing".<sup>27</sup>

How capable is the artillery on a fluid battlefield? Just what can a unit expect from fire support? The RAND Corporation, studying the effects of field artillery at the National Training Center at Ft. Irwin, revealed that the modern battlefield is too fluid for complex fire plans. Modern armored combat requires simple plans with few adjustments. During their evaluations, the reports showed that no unit adjusted artillery in any of the ten observed battalion rotations.<sup>28</sup> These rotations equalled about one hundred offensive and defensive battles.<sup>29</sup>

Artillery accuracy for planned targets was less than 45% of all missions while in the offense. Accuracy, by the way, was having rounds fall within 500 meters of the intended target.<sup>30</sup> Artillery planners, according to the study, plan fires well but do not emphasize verification in targeting, making accuracy questionable. Consequently, execution of the fire plan is a weakness in the Army.<sup>31</sup>

It seems that the Army cannot deliver on its promise of SEAD primarily through firepower alone. Fire support is indeed challenged to keep pace with armored formations moving

at 20-35 kilometers per hour (kmph). Can it stay apace with aviation units that move at 150 kmph in almost any direction?

So if Army aviation is a maneuver force, perhaps SEAD as currently stated in doctrine is useful, but too limited for air maneuver doctrine. Successful air maneuver must make use of its main assets--speed and agility. These assets are not just the products of the helicopters themselves. They are also the products of unit planning, deciding, and executing missions faster than the enemy. Responsive fire support is only half the answer. What is the rest of the equation?

#### What is suppression?

By definition, suppression is "direct and indirect fires, electronic countermeasures (ECM), or smoke brought to bear on enemy personnel, weapons, or equipment to prevent effective fire on friendly forces."<sup>32</sup> These are very active measures, mostly involving fire support. A definition from FM 101-5-1, Operational Terms and Symbols, is more closely associated with suppressive fires, giving an incomplete form of suppression. Included in the definition of suppression are direct fires which usually come from a maneuver element providing mutual support. Expanding the idea of suppression, a unit gives mutual support to another unit through assigned tasks, strong positions in relation to the enemy, and a unit's capabilities.<sup>33</sup>

Suppression now has a much broader context. A unit can suppress the enemy by being in the area. For instance, an enemy air defense gunner, upon hearing nearby tanks elects not to fire on aircraft for fear of drawing tank fire. A unit can also use its capabilities to avoid being shot at, making avoidance a form of suppression. So, fire support is a subset of the larger category of suppression.

### Army Aviation in Joint Operations

At the joint level, the role of Army aviation is in question. Current debates are ongoing about whether Army aviation fights in the aerospace environment, as in close air support, or operates in the ground regime, as a maneuver force.<sup>34</sup> Upon reviewing the literature, it appears that the Army believes aviation works in the ground environment.<sup>35</sup> Certainly, the current Army Aviation branch chief Major General J. David Robinson, thinks so: "We [Army Aviation] must stay in close proximity to the earth's surface, in the ground regime, for survivability and linkage with the ground environment."<sup>36</sup> If the Army has adopted air maneuver doctrine, then the Army must develop ways to keep aviation alive and relevant on the battlefield. One area that needs improvement is SEAD.

Most SEAD doctrinal discussion is at the campaign level and centers around the role and authority of the Joint Air Component Commander (JFACC).<sup>37</sup> These discussions do not

fully consider the role of the Army. Possibly the joint community tacitly agrees that Army aviation does not really belong under the JFACC but belongs to the Land Component and Army Commanders. Again Robinson and Burke state, "Under the control of the land force commander, these capabilities favorably influence battle calculus."<sup>38</sup> This leads to the conclusion that the Army is not a key player in this area. Possibly by design, the Army appears not too interested in the aerospace arena in any part of the key literature. According to FM 100-5, close air support is done by all of the services except the Army.<sup>39</sup> There is a disconnect between how the other services view helicopters (primarily as combat support) and air maneuver doctrine. What effect will this have on SEAD doctrine?

#### Conclusion

The literature indicates that aviation units prefer to be air maneuver instead of combat support. At the moment, there is no conclusive air maneuver doctrine in the field. Units grope for solutions, perplexed by aviation's versatility. The lack of doctrine creates significant problems.

SEAD doctrine is based on one main battlefield operating system, fire support. Despite a few examples to the contrary, the Army suppresses enemy air defenses mainly through lethal indirect fires and non-lethal fires. Fire

support becomes SEAD when units target dedicated air defense systems such as SA-8's, SA-11's, and SA-13's. The Army may need different answers to targeting than the D3 methodology because it may not always have highly accurate intelligence, ample resources, a great amount of time, and the communications ability to centrally control forces. SEAD execution suggests that this approach may prove inadequate to the task.



## ENDNOTES

<sup>1</sup>Colin L. Powell, "A Joint Doctrinal Statement of Selected Joint Operational Concepts", Statement issued from the Office of the Joint Chiefs of Staff, dtd. November 23, 1992.

<sup>2</sup>B.H. Liddell Hart, Strategy, (Faber and Faber: London, 1954), 334.

<sup>3</sup>William S. Lind, Maneuver Warfare Handbook, (Westview Press: Boulder, 1985), 9-18.

<sup>4</sup>Richard E. Simpkin, Race to the Swift, (Brassey's Defence Publishers: London, 1985), 228.

<sup>5</sup>U.S. Army, FM 100-5, Operations, (Washington: Department of the Army, 1993), 6-6.

<sup>6</sup>U.S. Army, FM 100-5, 2-6.

<sup>7</sup>Simpkin, Race to the Swift, 133.

<sup>8</sup>Simpkin, Race to the Swift, 134-139.

<sup>9</sup>U.S. Army, FM 100-5, Army Operations, 6-12.

<sup>10</sup>U.S. Army, FM 100-15, Corps Operations, (Washington: Department of the Army, 1990), 2-5. At the time of this thesis, FM 100-15 and FM 71-100 are undergoing revision. Based on conversations with some of the doctrine writers based at Fort Leavenworth, they seem to be moving to clarify that aviation is a maneuver arm.

<sup>11</sup>U.S. Army, FM 71-100, Division Operations, (Washington: Department of the Army, 1990), 2-3.

<sup>12</sup>FM 71-3, Armored and Mechanized Infantry Brigade, (Washington: Department of the Army, 1988), 5-22.

<sup>13</sup>U.S. Army, FM 6-20-40, Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Heavy), (Washington: Department of the Army, 1990), A-31.

<sup>14</sup>U.S. Army, FM 7-98, Operations in a Low-Intensity Conflict, (Washington: Department of the Army, 1992), 7-4.

<sup>15</sup>U.S. Army, Aviation Warfighting Center, "Aviation Warfighting Treatise," (Fort Rucker, AL: U.S. Army Warfighting Center, 1993), 6-19.

<sup>16</sup>U.S. Army, FM 6-20-30, Tactics, Techniques, and Procedures for Fire Support for Corps and Division Operations, (Washington: Department of the Army, 1989), B-38-B-40.

<sup>17</sup>U.S. Army, FM 71-101, Infantry, Airborne, and Air Assault Operations, (Washington: Department of the Army, 1987), 8-4.

<sup>18</sup>U.S. Army, FM 1-100, Principles for Army Aviation in Combat Operations, (Washington: Department of the Army, 1989), 1-17.

<sup>19</sup>U.S. Army, FM 1-111, Aviation Brigades, (Washington: Department of the Army, 1990), 3-122 and 4-1.

<sup>20</sup>U.S. Army, FM 1-112, Tactics, Techniques, and Procedures for the Attack Helicopter Battalion, (Washington: Department of the Army, 1991), 1-3.

<sup>21</sup>U.S. Army, FM 1-113, Assault Helicopter Battalion, (Washington: Department of the Army, 1986), 5-1.

<sup>22</sup>U.S. Army, FM 1-113, 3-14.

<sup>23</sup>U.S. Army, FM 100-15, 3-6.

<sup>24</sup>Author reviewed several CTC AAR's from the U.S. Army Center for Lessons Learned (CALL). Since the AAR's are for training purposes, CALL forbids unit identification or any specific data on training exercises. This non attribution policy is consistent with the intent of the reports, which is to show trends in training from the field, and improve battlefield performance.

<sup>25</sup>U.S. Army, FM 6-20-10, Tactics, Techniques, and Procedures for the Targeting Process, (Washington: Department of the Army, 1990), 1-3.

<sup>26</sup>U.S. Army, FM 6-20-30, B-9.

<sup>27</sup>U.S. Army, FM 6-20-30, B-36.

<sup>28</sup>Martin Goldsmith, et al., A Rand Note: Applying the National Training Center Experience: Artillery Targeting Accuracy, (Santa Monica, CA: The Rand Corporation, 1990), 28.

<sup>29</sup>Goldsmith, Artillery Targeting Accuracy, 10.

<sup>30</sup>Goldsmith, Artillery Targeting Accuracy, 29.

<sup>31</sup>Goldsmith, Artillery Targeting Accuracy, 23-24.

<sup>32</sup>U.S. Army, FM 101-5-1, Operational Terms and Symbols, (Washington: Department of the Army, 1985), 1-68.

<sup>33</sup>U.S. Army, FM 101-5-1, 1-49.

<sup>34</sup>John H. Cushman, "Fight as a Team," Proceedings, (January 93), 58.

<sup>35</sup>U.S. Army, "Aviation Warfighting Treatise," 6.

<sup>36</sup>J. David Robinson and Charles M. Burke, "Fighting Maneuver and Fires in the Third Dimension", Field Artillery, (April 1993), 11.

<sup>37</sup>The Joint Chiefs of Staff, Joint Pub 3-01.4, JTTP for Joint Suppression of Enemy Air Defenses (J-SEAD), (Washington: The Joint Chiefs of Staff, 1993), II-3.

<sup>38</sup>Robinson and Burke, Field Artillery, 11.

<sup>39</sup>U.S. Army, FM 100-5, 2-19.

### CHAPTER 3

#### RESEARCH DESIGN

Current U.S. doctrine and a historical review make up the research design. The historical data includes a review of three major U.S. military actions since 1971 beginning with Operation Lam Son 719. Lam Son 719 was the largest air assault operation of the Vietnam war. It was a joint U.S. and South Vietnamese operation to destroy the North Vietnamese buildup in Laos in 1971. It was significant in scope and pitted air mobility doctrine against a dense anti-aircraft network.

The second historical analysis is of Operation Urgent Fury, the invasion of Grenada by U.S. forces in 1983. Although small in scale, it does shed light on SEAD requirements for what the Army formerly called "low intensity conflicts." Urgent Fury gives breadth to our research because air defenses were light but the U.S. operated under stringent rules of engagement. This may offer some insight into SEAD requirements in what the Army now terms "Operations other than War."

Operation Desert Storm tested the concept of air maneuver. Not only were attack helicopter units key players

in the success of the war, but the operation contained the largest air assault in history as well. Helicopter units benefitted from a massive J-SEAD effort allowing units to freely employ maneuver throughout the battlefield.

Each operation includes both quantitative and qualitative analyses. The quantitative analysis revolves around helicopter losses. This thesis looks at helicopter losses by type, mission profiles, tactics, and weapons that destroyed them for each operation.

Since maneuver is more than system vs. system, this thesis also uses qualitative analysis. To better understand helicopter attrition, we must include the circumstances of the battlefield. Maneuver, fire support, air defense, command and control, and tactical intelligence are the areas of review.

### Planning

What was the general situation at the time? What was the course of action that the American force chose to accomplish the mission? What was the unit plan for Suppression of Enemy Air Defenses?

### Intelligence

Accurate intelligence is critical to SEAD success. How much did the helicopter force know about the enemy disposition? How timely was the intelligence? What did the helicopter force do to gain enemy information? Intelligence

reveals how much the aviation force knew about the enemy. Methods of obtaining this intelligence are reviewed. Were there any useful deception measures employed on either side of a specific conflict?

#### Air Defense

This thesis concentrates on enemy air defense capabilities, disposition, weapon systems, and effectiveness. What air defense tactics did the enemy employ?

#### Maneuver

What was the general friendly situation at the time? What were the ground forces in the area doing? (Were they moving, engaging the enemy, etc.?) How was the helicopter force used, and what types of missions were flown?

#### Fire Support and SEAD solutions

Analysis involves both localized and complementary SEAD procedures and planning. What lethal and non-lethal systems and methods were available to the force? How effective were they? Fire support includes field artillery, electronic warfare, smoke operations, and close air support.

#### Command and Control

This thesis reviews the following questions. Did the command and control structure influence SEAD operations? Was the synchronization of the aviation elements with the ground maneuver elements adequate and efficient? Aviation command

and control is a key factor. The objective is to find how the command integrated the helicopter force into the scheme of maneuver. By studying how helicopter operations were planned and controlled, this study better evaluates the overall effectiveness of aviation on the battlefield. Trends will be established if possible.

### Helicopter losses

How did the helicopters get shot down in each conflict? What kind of missions were the crews flying? What systems were most effective?

These conflicts were chosen because of their extensive use of helicopters, vastly different terrain, and occurrence over a wide span of time. The time span allows observations on the effects of different technologies at work.

This methodology should tell us the most effective systems used against combat helicopters, the battlefield conditions leading to helicopter losses, and the general disposition of opposing forces on the ground. The level of aviation integration will tell much aviation's responsiveness on the battlefield. By identifying these critical areas, one can then glean what methods and systems are successful on the present battlefield. It will also show what methods or systems are required to suppress enemy air defense systems in support of helicopter combat operations.

Solutions may incorporate the ideas of leading scholars in the field of maneuver warfare, such as those ideas found in Chapter 2. This approach is designed to arrive at the best SEAD solution for air maneuver. The "best" solution will consider current force structure, flexibility for integration of future technologies, and a subjective analysis of the feasibility of any doctrinal changes this new model may require. This creates a doctrinal solution for viable SEAD in support of air maneuver doctrine that can be used for the Army.



CHAPTER 4  
ANALYSIS OF LAM SON 719

Background

Lam Son 719 was the largest airmobile/air assault operation in the war in Southeast Asia, conducted from February 8 to April 6, 1971. American and South Vietnamese military commanders felt that a preemptive strike into the North Vietnamese Army's (NVA) Laotian sanctuaries would give the Army of the Republic of Vietnam (ARVN) much needed time to build their armed forces. U.S. forces also needed time to continue an orderly withdrawal from Vietnam.

Strong protests resulting from the Cambodian incursion of 1970 made Washington want to avoid American casualties outside South Vietnam. As a result, Congress passed the Cooper-Church amendment, prohibiting U.S. ground troop operations in Laos. Therefore, the combined U.S./ARVN operation began with the bulk of the ground forces composed of ARVN troops. U.S. aircrews were the only Americans allowed over the Laotian border. A large air assault operation was only possible with American support.

A U.S. helicopter force of 450-600 aircraft supported 20,000 ARVN troops.<sup>1</sup> These troops included Vietnamese

marines, rangers, and infantrymen - the best of the fledgling ARVN.

### Planning

The plan of U.S. Army General Abrams, the Military Assistance Command, Vietnam (MACV) commander, was bold but simple (See Figure 1). A swift US/ARVN raid into the heart of the Laotian sanctuary, focusing on NVA base camps 604 and 611, would disrupt known NVA plans for a spring offensive. Abrams' staff devised a four-phased plan. In Phase I, the U.S. Army cleared and secured Route 9 up to the Laotian border, including the abandoned base camp at Khe Sahn. Beginning on January 30, 1971, and finishing around February 6, the Americans would rebuild Khe Sahn into a communications and logistics forward staging base. After that, a two-day United States Air Force (USAF) bombing operation would suppress and "soften up" the NVA across the border.

Phase II was a three pronged ARVN assault across the Laotian border. The First (ARVN) Infantry Division, with tanks and armored personnel carriers, would conduct the main attack down Route 9 to seize the town of Tchepone, some 25 miles inside Laos.

Supporting the operations, ARVN rangers, marines, and airborne units would attack along the escarpments that lined both sides of Route 9. The 101st Airborne Division (101 ABN) provided helicopter support for these units. Collectively,

their mission was to set up mutually supporting fire bases by helicopter, prevent an NVA attack on the main effort, and provide timely fire support to the armored force.<sup>2</sup>

Phase III began once the First ARVN Division secured the vital road and trail junctions around Tchepone. The next task was to destroy base 604, making it unusable in the future. Moving into Phase IV of the operation, this attack continued to the southeast oriented on destroying base camp 611.

The plan required the ARVN to seize Tchepone in five days. After ninety days, the ARVN would return in time for the monsoon season in late April, preempting an NVA offensive. Events would prove that this timetable was too ambitious for the ARVN.

### Intelligence

At the start of the battle, the NVA in Laos contained elements of five divisions. This 12,000-man force began with twelve infantry regiments, two armor battalions, and nineteen anti-aircraft battalions.<sup>3</sup> Eventually the force peaked at 36,000 by early March 1971.<sup>4</sup>

The NVA had good intelligence of American and South Vietnamese activities, thanks to their well-developed intelligence networks. During Lam Son 719, enemy prisoners confirmed that the NVA correctly identified this possible course of action five months before the battle.<sup>5</sup>

Interestingly, "The press seemed to be able to pick up leads and develop them into news dispatches that gave every detail of the operation as of the end of January 1971."<sup>6</sup> The NVA correctly surmised that their enemy planned a massive air assault operation and they took measures to repel it. Not surprisingly, a large, well dug-in, and prepared force waited for the attack.

The American/ARVN side was not without good intelligence, but they routinely underestimated the enemy. They knew about the NVA plans for major offensive operations against Cambodia and several South Vietnamese provinces during the dry season (OCT-MAR) of 1970-1971.<sup>7</sup> U.S./ARVN planners also knew about the base camp locations and the estimated number of air defense systems. Unlike their adversaries, U.S./ARVN force planners became complacent about NVA capabilities. "We did so (underestimate the NVA) because we viewed the enemy through our own lens and judged him according to our own experience in Vietnam."<sup>8</sup> U. S. forces labeled the air defense threat in South Vietnam as very light.<sup>9</sup> U.S./ARVN forces also felt that the same environment held true in Laos. However, Laos was different from South Vietnam; a lesson the U.S. would learn the hard way.

To make matters worse, the terrain and weather worked against air operations. Marginal weather during the operation usually limited helicopter flights to a five-hour window; from 1000 to 1500 hours.<sup>10</sup> The weather also severely

hampered USAF support operations, forcing the helicopter gunship escort requirement to increase by 100% for most escort missions.

High, well-vegetated mountains added to the U.S./ARVN problems. The combination of rugged terrain and bad weather created serious tactical problems. Covered, mountainous terrain offered few fields suitable for helicopter landing zones allowing the NVA to target and defend all of the obvious landing sites. The routinely foul weather, known as crachin, brought low clouds; confining aircraft to the valleys where the NVA could mass its firepower.<sup>11</sup>

#### Enemy Air Defenses

Almost immediately, the 101 ABN realized that the enemy possessed extensive air defenses. The 101 ABN's own AAR reads, "Whatever label is affixed to the air defense environment in LAM SON 719, it represented the most sustained anti-aircraft fire experienced by U.S. helicopters in this war."<sup>12</sup> There were 150-200 medium caliber (23-100mm) anti-aircraft guns contained within nineteen anti-aircraft battalions. There was no count of how many 12.7mm machine guns were in the area of operations, but estimates were in the hundreds.<sup>13</sup>

Dedicated air defense weapons larger than 23mm were significantly ineffective. The 12.7mm machine gun became the biggest helicopter killer. Machine guns were a central part

of all arms, anti-aircraft defenses. They were comparatively easy to relocate, gave no real signatures, and their crews possessed excellent fire discipline.

#### Air Defense Tactics

Almost all prominent terrain features had solid "horseshoe block" defenses, consisting of well dug-in, crescent-shaped, covered trenches.<sup>14</sup> Every landing zone (LZ) was triangulated with pre-registered (therefore, highly accurate) mortar, rocket and artillery fires.<sup>15</sup> These defenses were well camouflaged and well coordinated with excellent fire discipline.<sup>16</sup> The NVA frequently moved firing positions, sometimes nightly, with mutually supporting firing positions. As a minimum, positions redeployed every six or seven days regardless of compromise.<sup>17</sup>

As operations progressed, the NVA improved their anti-helicopter tactics. Most common were "hugging tactics." Designed to limit the effects of massive firepower, hugging tactics called for the NVA troops to close within ten to twenty meters of ARVN forces once they departed their helicopters. Except in extreme cases, reluctant U.S./ARVN forces did not bring indirect fires or close air support fires in this close to friendly soldiers.

After the first soldiers landed, the NVA landing zone defense began. Fire discipline usually prevented the U.S./ARVN forces from effectively targeting gunners around

the LZ before the first lift arrived, giving NVA gunners the element of surprise. After the initial lift landed at the LZ, the U.S. helicopter units became obligated to withdraw or reinforce these initial ARVN soldiers, especially if attacked. All sides knew that more helicopters would show at the landing zone.

After the initial helicopters lifted off the LZ, the NVA engaged these helicopters with all available forces. Frequently, mortars engaged the next helicopters bringing more soldiers to the fight. AAA and infantry moved in to seal most ground approaches. This ever-tightening noose strangled the landing zone defenders until the only way out was through the air.<sup>18</sup> Downed helicopters piling up at the LZ, increased pressure on ARVN forces defending the fire bases. The downed helicopters congested the landing zone; limiting the number of aircraft that could land there.

The NVA also employed deception. Colored smoke usually marked for aircraft the location of ARVN troops. Through intercepted ARVN transmissions, the NVA used this smoke to lure aircraft into ambush sites.<sup>19</sup> They also used downed aircraft to bait aircraft into kill zones. In one instance, three aircraft were lost trying to recover a decoy aircraft.<sup>20</sup>

### Maneuver

After some initial success, Lam Son 719 unraveled quickly. The American force finished Phase I by late afternoon on February 5 despite heavy rains. Rain, however, kept the USAF bombers on the ground, forcing the cancellation of the two-day preparation (See Figure 2).

Years of bombing made Route 9 so pocked with bomb craters that a swift advance was impossible. Without extensive engineer support, the road was suitable for only tracked vehicles. Adding to the misery, the rains caused the vehicles to become mired in the thick red, clay of Route 9.

NVA resistance in the early going was light. With their good intelligence, the NVA seemed content to trade space for time; allowing the ARVN to go deeper into Laos while they built up forces for a counterattack. Knowing that the terrain limited off-road mobility, they harassed ARVN forces with small minefields; while concentrating on the heliborne assaults that were sure to come.

On the third day, the main thrust linked up with the 9th Airborne Battalion, previously lifted into an LZ near A Loui. ARVN forces established four mutually dependent fire bases on the northern escarpment, while establishing five bases in the south. The ARVN was halfway to Tchepone, seemingly on schedule.

Then General Lam, the ARVN forces commander, inexplicably halted the armored column at Ban Dong and



awaited orders. An angry General Abrams tried to persuade Lam South Vietnam's President Thieu that the lost time was crippling chances for success. Five crucial days passed, giving the NVA time to recover from the initial attack.

NVA reaction came gradually, but their ever-increasing strength eventually gave them an overall manpower superiority of two to one. Heavy AAA fires and the tough flying weather made air operations very costly for the Americans. By having some reprieve from air operations, the NVA began massing forces; intent on destroying the ARVN fire bases one by one. The ARVN's cautious nature played to the strength of the methodical NVA.

Around February 18, the NVA counterattacked the lightly defended fire bases to the north of Route 9. Despite massive U.S. firepower support, and the stiff resistance by the ARVN defenders, they could not save two fire bases (Ranger North and Ranger South). The ARVN forces abandoned them after eight days of heavy fighting.

As these units withdrew southward, fire bases closer to Route 9 came under increasing pressure. By March 3, 1971, the ARVN lost almost all of the bases in the north or were under heavy pressure with high casualties. The main attack along Route 9 had stalled.

In the south, the ARVN established two fire bases at LZ Lolo and LZ Sophia in the middle of the NVA defenses. After the Americans lost eleven UH-1 Hueys and the NVA

damaged thirty-five others in one day at Lolo, one pilot remarked, "They put in five hours of airstrikes and Cobras on that hillside .... Then we went in and it sounded like a million people opened up on us."<sup>21</sup>

On March 6, in a symbolic, face-saving gesture, the U.S./ARVN forces launched the largest air assault of the Vietnam war near Tchepone. Media attention focused on that town. The pressure to seize the town was immense. This one-hundred helicopter force landed in a field, appropriately named LZ Hope, four kilometers away from the town, then the ARVN briefly marched into Tchepone. By March 8, this force withdrew by marching to LZ Sophia, arriving early the next day.

The NVA responded by not directly counterattacking the aircraft near Tchepone, but by cutting off the eventual ARVN withdrawal. When the order to withdraw came on March 9, the NVA was ready. With their anti-aircraft defense umbrella still intact, and supported by tanks, the NVA attacked with fervor. Showing a willingness to take heavy losses from U.S. firepower, the NVA almost destroyed the best of the ARVN. The ARVN eventually fought its way out of Laos, being forced to abandon much of its equipment. Only massive U.S. air support prevented its complete destruction.

Most of the ARVN retreated to South Vietnam by March 22, 1971. On the positive side, Lam Son 719 did force the NVA to postpone their upcoming offensive by two to six

months. However, it failed its mission to destroy the NVA base areas and stay in Laos for the ninety days of continuous raiding. Lam Son 719 forced a complex mission upon the ARVN that it was not ready to handle. The U.S. learned that helicopters were vulnerable but highly resilient aircraft. Lam Son 719 became a model for the mid-intensity battlefield, spurring changes in U.S. Army doctrine.

#### Command and Control

The need for secrecy and the political sensitivities of the Cooper-Church amendment created planning problems. There was some initial, early planning, but official warning orders for joint and combined operations allowed only a month of preparation.<sup>22</sup> Airmobile operations require intensive training. Without adequate preparation, airmobile operations can be "disastrous."<sup>23</sup> U.S. forces had experience planning large operations, and could organize quickly, while the ARVN did not, causing them to balk at many American suggestions.<sup>24</sup>

Agreements replaced decisions, further slowing the orders process. There was no overall commander in the doctrinal sense for heliborne operations.<sup>25</sup> This left the ARVN in charge of large portions of the ground campaign, while the American 101st Airborne Division ran all helicopter operations. Both command posts were widely separated, further complicating coordination.<sup>26</sup>

The plan became two separate plans: the armored attack on Route 9, and the air assault on the escarpments. Since it was conceived at two separate headquarters, the air assault at the 101 ABN and the ground attack at the ARVN headquarters, it is not surprising that they were not mutually supporting. As a result, once the NVA figured the U.S./ARVN true intentions, they defeated them separately. Knowing the ARVN's great dependence on the aerial umbilical cord, the NVA exploited this weakness. So the NVA blunted the Route 9 attack, isolated the separate fire bases along the ridges, and then strangled these bases one at a time.

The planners depended on massive firepower to prevent helicopter losses. Critical to the firepower answer was having trained observers reporting enemy positions quickly and accurately to the firing batteries. The policy of no U.S. ground troops in Laos prevented U.S. advisors from helping with the critical functions of calling for accurate fires and air support. Soldiers improvised to break through language barriers and procedural differences, but they could not overcome weak ARVN communications security. Enemy listening posts monitored radio traffic and quickly reacted to avoid fires. The problems were so great that one aircrew lamented, "It's safe to say that, from the first day to the last, communications security by U.S. and ARVN forces was terrible ...."<sup>27</sup>

### SEAD solutions and Fire support

The SEAD solution had two major weak points. These were an overdependence on helicopters, and an overreliance on firepower to protect helicopters. Commanders depended on the helicopter too much. Helicopters became more than a means of movement. They became a necessity to the plan. In Lam Son 719, the plan relied on the helicopter to keep fire bases manned and supplied. There were few or no alternatives. While being a testimony to the courage of the aircrews who flew in the face of the prolific threat, it was a very optimistic assumption.

The ARVN forces were notorious for depending entirely on the helicopter for success. During the operation, many units called for air support at the first sign of trouble. Many ARVN units did not take any measures to protect the landing zones. They expected the helicopter force to get them out of trouble. This overdependence of helicopters was the same criticism of the American military in Vietnam.<sup>28</sup> A frustrated General Abrams remarked, "I don't know if ARVN is going to copy any of our good points, but they sure as Hell will copy all the bad ones."<sup>29</sup>

Without the helicopter, Lam Son 719 would have been impossible. However, a complete dependence on the Vietnam-era helicopter was a mistake. One glaring weakness of helicopter operations is the weather. While helicopters encounter few terrain obstacles, poor weather is sometimes

insurmountable. In this operation, the weather was indeed a difficult obstacle to breach. Helicopters had few choices but to fly into the guns. Without a strong ground offensive that caused enemy forces to shift, solely depending on the helicopter became the plan's liability, even with massive fire support.

Overdependence on the helicopter's faithful service spawned another phenomenon. Since this was essentially a war of attrition, firepower played a large role in the Army's plans. If the Army was to depend primarily on the superior mobility of the helicopter to get at the enemy, then firepower was going to keep the helicopter from being shot down. "General Abrams was counting heavily on U.S. B-52 strikes, suppressive fires, . . . and the tactical mobility provided by . . . helicopters."<sup>30</sup>

This approach reflected the doctrine of the day. In FM 57-35, Airmobile Operations, it advocates the massive use of firepower being brought to bear in airmobile operations, especially around the landing zones.<sup>31</sup>

The U.S./ARVN firepower solution was similar to the D3 methodology of today. The answer was a reconnaissance (decide, detect) and firepower (deliver) solution. Most of the reconnaissance tasks fell to the 2-17th (AIR) Cavalry Squadron (2-17 CAV), and they became the main executor for localized and complementary SEAD missions. They had to find the AAA and destroy it with fire support. "The air-cavalry-

armed helicopter-artillery-tactical air combination proved unbeatable as a recon-target acquisition-firepower-BDA team<sup>32</sup>." These same tactics worked in the sparse anti-aircraft environment of South Vietnam, but they were "disastrous" in Laos as heavy anti-aircraft defenses racked up helicopter losses.<sup>33</sup> Even after the operation, planners still believed that a lavish application of firepower was the key to SEAD.

The governing principle was to place maximum firepower in a minimum amount of time in and around (LZ/PZ's) and along approach and departure routes. Massive and accurate application of preparatory firepower did more than any other single factor to guarantee success in airmobile operations . . . .<sup>34</sup>

In Lam Son 719, a typical air assault mission was a highly planned and very detailed operation. The 2-17 CAV reconnoitered the routes, including approach and departure routes, and the intended PZ's and LZ's. When they found or suspected enemy locations, they engaged these positions or "prepped" the LZ with tactical air, artillery, or helicopter gunships.<sup>35</sup> Planned, centralized fires were similar to current localized SEAD doctrine.

Conducting a "prep" means using massive firepower, a luxury in this operation. The 101st ABN fired on most suspected targets using a great amount of ammunition, hoping to hit some of these targets. "[In Lam Son 719] the United States would commit more air and artillery support to a single battle than at any time during the Vietnam war."<sup>36</sup> The

Air Force flew more than 8000 combat sorties, and the U.S. Army fired more than 500,000 rounds of artillery in support of Lam Son 719.<sup>37</sup>

The force had many firepower options, each with advantages and limitations. If the LZ was in range, artillery was the preferred weapon because it was not limited by the weather. However, it was comparatively slow to fire. Armed helicopters were the most accurate in responding with immediate suppression, but helicopters had limited station time.<sup>38</sup> Finally, if on station, Air Force tactical air was the best solution. A fixed-winged aircraft could achieve a stand-off range from most AAA weapons, and deliver great amounts of ordnance. However, weather could stop operations, making tactical air unreliable.<sup>39</sup> During Lam Son 719, the United States Air Force (USAF) scheduled combat aircraft sorties every fifteen minutes, but if the fighter crews could not see the target due to cloud cover, they aborted the mission. However weather had little effect on the B-52 bomber strikes that joined in the close support missions to annihilate enemy installations and troop concentrations.<sup>40</sup>

Once the initial localized SEAD bombardment subsided, the cavalry did a low-level, more detailed reconnaissance to gauge the enemy resistance. If they encountered no resistance, they called headquarters to notify the troop-carrying helicopters. The cavalry remained at the LZ leading the lift aircraft into the landing zone ready to fire



complementary SEAD. If the enemy was still active, another bombardment began until enemy resistance ceased or significantly reduced. Although sometimes effective, it telegraphed the LZ's location and alerted the NVA to U.S./ARVN intentions.

A sparsely populated area of operations made this deluge of ordnance possible, but firepower had its problems. Coordination proved problematic. Orchestrating this operation stretched the limits of communications creating gaps in fires. The NVA reacted quickly, using the time gaps to reposition their forces. U.S./ARVN forces solved the time gap problem resulted by dividing the landing zone into sectors where each fire support system could operate in its respective sectors without interruption.<sup>41</sup> Conceivably, this allowed simultaneous delivery of all available firepower.<sup>42</sup>

The Army mimicked the system for controlling firepower that had worked fairly well in Vietnam by establishing a very rigid system of fire and air movement. Built into every helicopter operation was the idea of "air corridors" or areas of safe passage for aircraft.

Corridors were blocks of protected airspace. This airspace theoretically prevented aircraft from being shot down by friendly indirect fire. Artillery units shot over, under, or around these blocks. If the enemy engaged aircraft while the aircraft was in the block, the coordinators moved the box to safer areas and suppressed the enemy. While

simple in theory, it was difficult to shift corridors in time to engage the enemy. It was difficult in static situations and almost impossible on fluid battlefields. "The process took a great deal of time, and any unexpected development in the tactical situation caused this fragile and inflexible system to break down quickly."<sup>43</sup>

In Lam Son 719, this system collapsed. Anti-aircraft defenses were so thick that when air corridors changed, the situation rarely improved. The system's inherent inflexibility could not manage to keep up with the high volume of changing suppression requirements created by helicopter crews flying evasive maneuvers. These flight route changes, and their subsequent air corridor corrections, overloaded the fire support system. "More often than not, frictions of war combined to limit the killing power of fire support as effectively as it limited the decisiveness of maneuver in the jungle."<sup>44</sup>

The ARVN forward observers, controlling fires, compounded the problem of congested fire control nets. Not knowing the location of friendly forces also caused frequent firing delays. In Vietnam, even American observers had problems clearing fires. "Even in the best circumstance, time delays occurred ranging from two to eight minutes--often just enough time for a stunned enemy to collect his wits and ... take aim ...."<sup>45</sup> In Laos, the task of trying to get clearance of fires proved to be insurmountable at times.

## Targeting

An elusive enemy using good camouflage in the dense jungle made targeting extremely difficult. "The most difficult aspect of engaging NVA anti-aircraft weapons was to pinpoint the exact locations of the weapons."<sup>46</sup> An enemy that uses passive measures against visual means usually remains hidden, making U.S./ARVN force choose between two options. The first option was aerial reconnaissance designed to draw fire. Once the NVA betrayed their position, aerial observers attempted to obliterate it with all firepower means available. This was effective, but put aerial scout crews at great risk. Attrition of scout pilots in Lam Son 719 made that occupation a most hazardous duty.

The other option was that the U.S./ARVN force made educated guesses at suspected enemy locations. The problem with this approach was that there was no feedback or battle damage assessment. Units simply did not know the effectiveness of their fire, forcing them to shoot more fire missions. The planners believed more fire was better.

"Preps" became standard throughout the Army. That was part of the problem; the enemy knew their intentions as well. For instance, a white phosphorous artillery round signified that it was safe for the helicopters to land and signaled the enemy to come out of their holes and prepare to greet the landing helicopters.

While some units in Vietnam mentioned that they employed deceptive fires and false insertions, the 101st After Action Report does not suggest that they used these techniques. Perhaps it was simply unmentioned. Possibly the ad hoc fire support system could not support this type of planning.

### Analysis of Helicopter Losses

Official helicopter losses, an indirect measure of SEAD effectiveness, were 108 helicopters. Some authors dispute the official claim and estimate losses at over 200.<sup>47</sup> At its peak, the 101st had more than 600 helicopters committed to the operation. If one considers the sortie rate of .0025 losses per 100,000, helicopter losses were roughly equivalent to the fixed-winged attrition rate.

Despite the optimistic sortie rate, the number of destroyed or damaged helicopters is significant. Almost every helicopter in the operation was struck by fire to insert or extract desperate ARVN soldiers against fierce, daily NVA opposition. The total number of damaged aircraft was 451 helicopters.<sup>48</sup>

Since troop-carrying helicopters were most vulnerable as they decelerated to land, NVA units destroyed most of the aircraft around the landing zones. Seventy-seven percent of all the downed Hueys were shot down this way.<sup>49</sup> Scout or attack aircraft had to suppress these guns, usually

flying level to line up their weapons on the air defense guns. By doing so, they became excellent targets themselves. Eighty-one percent of the downed attack helicopters were destroyed while attacking enemy air defenses.<sup>50</sup>

### Conclusions

The massive scale of helicopter operations, the significant density of air defenses, and the operation's inherent complexity make Lam Son 719 an excellent case study for SEAD. Helicopter crews displayed tremendous courage in the face of withering fire, and their aircraft proved to be very hardy. The daunting task of controlling this operation validated the idea of airmobility. However, there were serious problems.

The plan was too optimistic. U.S./ARVN planners underestimated the ferocity of the NVA defenders. They also overestimated the ARVN's ability to accomplish a large, complex operation. Commanders discounted the weather's impact and they assumed that with enough firepower, the helicopter would always get through. "His anti-aircraft system would be effectively neutralized by our devastating firepower. Our helilift capabilities and mechanized assets would make short work of the occupation of key objectives."<sup>51</sup>

Firepower alone was not the answer. Stringent control measures failed to keep pace with the tactical situation. Control of fires broke down under the strain of inexperienced

observers, giving the NVA time to recuperate at critical moments. Depending solely on helicopters and firepower, the U.S./ARVN became too predictable in their approach.

Machine guns were the most effective anti-helicopter weapons, because they were almost impossible to locate accurately. Gun crews frequently repositioned their guns before massive U.S. fires rained down on them. The great number of guns served to overwhelm the U.S./ARVN fire support system by overloading targeting planners. Fire discipline made these guns difficult to target and they became very lethal by holding their fire until the helicopters came into point-blank range.

Dedicated AAA guns were not very effective against helicopters. They destroyed only three helicopters.<sup>52</sup> Targeting and locating was easier because they could not move as easily as machine guns, and they had unique signatures. Their larger crews and specific tracer patterns made them more pronounced, and they were more frequently suppressed.

Overall, the plan splintered because of the separated command arrangements for air and ground operations. Lack of coordination put forces into the battle piecemeal. The NVA used this to their advantage and defeated their opponents separately. Fractured planning existed in SEAD operations causing inadequate fire support. SEAD requirements outstripped the fire support capabilities. A more comprehensive operations plan, using ground maneuver,

airmobility, and responsive fires aimed at exploiting NVA weaknesses could have paid off.

## ENDNOTES

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<sup>6</sup>Hinh, LAM SON 719, 151.

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## CHAPTER 5

### ANALYSIS OF OPERATION URGENT FURY

#### Background

On October 25, 1983, the United States invaded the Caribbean island nation of Grenada. Called Operation Urgent Fury, President Reagan ordered the invasion for three main stated reasons. First the safety of 1000 Americans living on the island concerned him, particularly after a bloody coup that overthrew the Marxist regime. Secondly, he viewed the stability of the island as deteriorating rapidly. Regaining stability in the region was a great concern. The last publicly stated reason was to restore law and order and the governmental institutions on the island.<sup>1</sup>

#### Planning

A sense of urgency permeated the planning. Fear that a potential American hostage crisis by the leaders of the recent coup put pressure on planners to accomplish the invasion quickly. The lack of current intelligence, and the decision to scrap Contingency Plan 2360 (an existing plan for civilian evacuation of the island) forced the plan to change often. Planners developed a much broader concept than the contingency evacuation plan. The new plan called for the

complete seizure of the island, meeting the political goals of the president, namely safeguarding the island's American inhabitants. Speed was essential and had top priority in planning.

To completely take the island in a coup de main, the plan required three phases (See Figure 3). In the first phase, special forces units would secure key sites around the island, mainly in the St. Georges area. Army Rangers would seize the Salines airfield in the south, then secure the American medical school's True Blue campus and the enemy barracks site at Calvigny. A Marine force would secure the Pearls airfield in the north. Phase I would end on the first day.

Phase II marked the arrival of the 82d Airborne Division (82d ABN). As the follow-on force, it would relieve the Special Forces by D+1. The division's job was to begin clearing the People's Revolutionary Army (PRA) forces around the southern part of the island. The Marines needed to clear the PRA from the northern half of the island. Phase III's objective was to keep law and order, and eventually hand over those functions to the police force of the other Caribbean nations, and then eventually to the Grenadians themselves.

#### Intelligence

From the beginning, intelligence for this operation was weak. The U.S. forces did not know much about the

islands or the American presence there, particularly the American students attending medical school there. The intelligence community believed that all of the students were living at the True Blue campus when in fact, there were two satellite campuses with students living in the surrounding towns and villages. Shortfalls in other areas led to many blunders.

There were not even proper maps with grid coordinates. From the military point of view, the lack of accurate intelligence was to be the most serious failure of the operation. Intelligence shortcomings were directly responsible for Urgent Fury's delayed H hour, loss of surprise, slow development, tactical failures, and unnecessary casualties.<sup>2</sup>

Facing the U.S. invasion force was the PRA and its Cuban advisors. U.S. intelligence estimated the PRA to be twelve hundred strong, supported by 2000-5000 militia with 300-400 armed police. There were also 30-50 Cuban advisors and 600 construction workers.<sup>3</sup> Actually the PRA had 450-475 regulars, fewer than 250 militiamen, 635 construction workers and forty-three military specialists.<sup>4</sup>

Comparing both estimates, U.S. planners decided to err on the side of caution and they estimated that the total enemy force consisted of ten battalions.<sup>5</sup> Intelligence correctly surmised that most of the PRA would defend in the St. George's area, clustered around Forts Rupert and Frederick.<sup>6</sup>

The PRA was only one challenge; the terrain was another. Grenada is a small, volcanic, mountainous island

that is twenty-one miles long and twelve miles wide. Its well-vegetated surface limits aerial observation of ground forces. Its highest peak is 2756 feet above sea level. The weather posed few military challenges for U.S. helicopter forces.

From a military standpoint, the terrain proved difficult. The predominantly rocky coast made amphibious operations hazardous. The volcanic hills, dense brush, and high humidity took its toll on infantry maneuver. According to the planners, terrain considerations and limited cargo space ruled out the use of armored vehicles or aerial reconnaissance.<sup>7</sup> However, not all helicopter operations were ruled out. The terrain and the sense of urgency made direct helicopter assaults an integral part of the plan.

Unfortunately, there were no large landing zones on the island, preventing large assaults. The planners could not use overwhelming forces from the air; they would have to assault with a few helicopters at a time.

Also impinging on the plan was the need to minimize casualties. Generally, Grenadians liked the American citizens on the island, and the American military preferred to keep it that way. Grenada's major city is St. George and during Operation Urgent Fury, it contained most of the island's key targets. With a population of 30,000 people within the city and its outlying areas, judicious use of

firepower was important. This made the command impose strict rules of engagement.

### Enemy Air Defense

The Grenadian anti-aircraft units consisted of six ZU 23-2 guns and twelve 12.7 mm machine guns. Other sources put the number of ZU 23-2's at twenty guns.<sup>8</sup> Regardless, the PRA did not have enough crews to man all these guns.<sup>9</sup> The Joint Force leadership characterized the training of these crews as "lousy" and did not perceive the AAA to be a threat to aircrews.<sup>10</sup>

The gunners did not use any special air defense tactics or techniques. They seemed content to man their guns in place. Emboldened by their first successful engagements of aircraft, the crews proved much better than the U.S. military anticipated.

The ZU-23-2's were sprinkled around the island in key places. Two guns were at the PRA logistics base at Frequente, two were at Fort Rupert, and two more guns were at Fort Frederick. Four 12.7 mm guns augmented Forts Frederick and Rupert. The PRA also located two 12.7's at D'Arbeau above the quarry there and two at Pearls airfield.<sup>11</sup>

These systems were antiquated air defense technology. While the ZU-23-2 has an effective ceiling of 8,200 feet, it has no radar or night capabilities. Its range is 2000 meters. The 12.7 mm gun has four barrels and has a range of

1500 meters. It is a daytime only, line of sight system.<sup>12</sup>  
On the island, they normally sat exposed on the hilltops.

### Maneuver

The Joint Chiefs of Staff (JCS) issued the Execute Order to "conduct military operations to protect and evacuate U.S. and designated foreign nationals from Grenada, neutralize Grenadian forces, stabilize the internal situation and maintain peace."<sup>13</sup>

U.S. Special Forces commenced operations on Grenada. Their main objectives were to reconnoiter key sites of military value, and secure key facilities and political figures. Navy SEAL (Sea, Air, and Land) teams reconnoitered potential sites for amphibious landings by the 22nd Marine Amphibious Unit (MAU) around Pearls. Rescuing Sir Paul Scoon, Grenada's Governor General, from St. George, and destroying the radio transmitter of Radio Free Grenada became missions for other SEAL teams. Army special forces reconnoitered the Salines airfield before the Ranger's airborne assault, and other units were to rescue political prisoners being held by the coup leaders in the Richmond Hill prison.

These units had mixed success. The successful reconnaissance at Pearls made the Marines change their plans from an amphibious and heliborne assault, to a heliborne assault only. The landing zone was moved because the SEALs



reported two 14.5 mm guns at Pearls airfield.<sup>14</sup> The SEALs at the governor's house rescued the Governor General, but were quickly surrounded by Grenadian forces in armored personnel carriers. The reconnaissance team at Salines failed to clear the lightly defended runway for a Ranger landing. The enemy resistance prevented the team from clearing the runway creating turmoil on the inbound aircraft, and forcing the Rangers to parachute into Salines.

Despite monumental confusion based on faulty intelligence, the Rangers seized the Salines airfield by 1000 on the first day. Continuing to expand the security perimeter of the airfield, they secured the students at the True Blue campus. They soon learned of other students scattered over the island at two other satellite campuses. Immediately the Rangers prepared plans to rescue the other students, while simultaneously preparing for the 82nd Airborne arrival at Salines.

In the north, the Marines attacked Pearls airfield by helicopter. Landing at an alternate landing zone (the primary, based on aerial photos, was unsuitable) named 'Buzzard,' the Marines met light resistance. Pearls airfield belonged to the Marines by 0730 on the 25th. Immediately following this mission, another Marine heliborne assault secured the village of Grenville. Again, light resistance allowed the Marines to secure the village by 0630 in the morning.

The rest of the Marine force sailed to the island's western coast and landed near the town of Grand Mal. This force was to link up with the SEAL team that was still besieged by the Grenadian force at Governor Scoon's residence. The Marines occupied Grand Mal by 2400 on the 25th.

The 82d ABN paratroopers began to arrive at Salines by 1405 on October 25, 1993. Delays in the arrival of main force paratroopers placed the Rangers under the operational control of the airborne division. They expected to be relieved by the 82nd, but now they would play a far greater role in Urgent Fury.

Once the 82d ABN arrived in force, it began the arduous task of clearing the area surrounding the Salines airfield. Hot, humid conditions, along with a general sense of confusion, caused slow progress. As the 82d ABN pushed toward Grand Anse, the division commander tasked the Rangers to seize the newly-discovered campus there.

Due to pressure from the Joint Chiefs of Staff, the need to secure the other students on the island became a critical concern to U.S. commanders. It took U.S. forces thirty-six hours to seize the Grand Anse campus, despite the fact that it was only two and one-half kilometers from the Salines airfield. Overcoming differences in techniques between the two services, the Rangers, supported by Marine pilots, conducted an air assault to secure the 244 students.

The mission succeeded but resulted in losing one helicopter to ground fire.<sup>15</sup>

The last major attack occurred on the barracks at Calvigny Point. Elements of the Rangers and the 82nd seized Calvigny by late afternoon on October 27, 1983. Mopping up operations lasted from October 27 to November 2.

#### Summary of Helicopter Operations

##### Mission One: Task Force 160

Urgent Fury consisted of four major helicopter operations. The first helicopter operation was a series of special forces assaults on the Richmond Hill Prison and the Beaujesour radio station. The results of the operation are still in question and most of the information is still classified. At least two helicopters were shot down in these raids, and some authorities put the figure at seven aircraft.<sup>16</sup> Regardless, most accounts grade the missions negatively.

First, the raids did not go as planned. As with the other parts of Urgent Fury, the special forces did not know the enemy locations and believed resistance was negligible. Special operation aviators from Task Force 160 and Delta teams had little time to prepare for the mission. To make matters worse, the cargo planes carrying the helicopters arrived late. The mission, originally scheduled to begin

before dawn, took off seventy-five minutes late in daylight, with inadequate intelligence of the enemy.<sup>17</sup>

The operation called for simultaneous raids, using nine UH-60 Blackhawk helicopters. Taking off together, the assault teams would then separate and attack the radio station on Beausejour, the Governor's house, and Richmond Hill Prison.

The assault on the Beausejour transmission station was very successful. The transmitter located along the beach, was easily identifiable, while enemy resistance was nonexistent. These factors made this a flawless helicopter operation.

Seven Blackhawks continued in broad daylight to the Governor's house, and were engaged by as many as eight AAA guns and small arms. Two helicopter aircrews frantically tried to identify their landing zones. On their second attempt, they found the LZ. While sustaining damage, the aircraft put SEAL Team 6 on the ground to secure the residents. The Marines landing at Grand Mal eventually relieved SEAL Team 6.

The five remaining Blackhawks continued on to Richmond Hill Prison. Again aircrews searched for the LZ; comparing the ground with old, unreliable aerial photographs. Flying with no suppressive fires available, the crews decided to attempt a landing near the prison. Suddenly, every weapon system in the area fired on the crews. After aborting a

first landing attempt, the Blackhawk crews attempted a second landing. As a result, U.S. forces lost one aircraft, and suffered damage to all of the remaining aircraft. Having several wounded on board each aircraft, the crews aborted the mission.

#### Mission Two: Marine Air Assault

In their company-sized air assaults in the Pearls/Grenville area, the Marines chose to land at alternate LZ's because their original assessment of the landing sites was wrong. The SEAL team's reconnaissance changed the original plan at Pearls. Since the ground reconnaissance found the location of two AAA guns, the Marines chose to avoid them. The helicopter commander changed the LZ to an undefended location. The lift helicopters flew out of range of the guns, while the escorting Cobras provided accurate, direct suppressive fires on the guns. Once the troops were on the ground, they cleared the knoll where the guns were located and captured them.<sup>18</sup> They were successful largely due to the light resistance encountered.

#### Mission Three: Marine Cobra support for the Rangers

The only attack helicopters available to the task force were the Marine Amphibious Unit's (MAU) four AH-1 Cobras. As the Army had a greater need for air support, the Joint Task Force Commander tasked these four Cobras to support them.

Due to communications problems, coordination difficulties between the Rangers and the Marine pilots caused some confusion.<sup>19</sup> No one knew the extent of ADA in the St. Georges area. Two Cobras wound up tangling with six well-hidden AAA sites. A stringent set of rules for engagement around the city placed these crews at a distinct disadvantage.

Later the pilots said that they felt confined to limiting collateral damage that forced them into tight and predictable tactics.<sup>20</sup> One such instance caused the pair of AH-1's to make five firing passes over the same target. This action put them in range of every weapon system around the St. Georges area. On the fifth pass, one Cobra was shot down. The wingman was also shot down trying to protect the downed crew from PRA forces. These Cobras were expected to provide their own complementary SEAD. Confusion, strict rules of engagement, and faulty techniques created the conditions that got the first Cobra shot down.

The other Cobra crew remained to suppress the guns and protect the downed crew. After contacting a CH-46 to help in the rescue, the crew tried to suppress the targets by themselves. This version of complementary SEAD ended with that Cobra being shot down as well. The Marines bravely flew beyond their machines' capabilities against such a threat.

#### Mission Four: The Grand Anse Raid

The next helicopter mission was an ad hoc joint venture. The Rangers had to secure the campus satellite of Grand Anse. Originally, the plan called for the Rangers to seize the campus on foot. As the operation began to bog down, the plan fell behind schedule. The appointed deputy task force commander, Major General Schwarzkopf, decided that the Marines would help the Rangers by providing the necessary helicopters to assault the campus. He later commented on his frustration about seeing the campus from his command ship, and not being able to secure it. From his vantage point aboard the ship, he felt the beach was large enough to support a helicopter assault.<sup>21</sup> The Marines reluctantly agreed. Neither the Rangers nor Marines liked the idea of a hasty plan with little enemy intelligence.

However, this operation had better intelligence than the previous missions because there was direct contact with the students via ham radio and telephone. Students reported about sixty troops with three machine guns were south of the campus.<sup>22</sup> Because the speed of this operation was paramount, the commanders deemed that no tactical reconnaissance was necessary. Luckily, the operation went quickly, despite one CH-46 helicopter lost to ground fire and crashing into the surf and one CH-46 hitting a palm tree, as its crew was trying to land on a narrow strand.<sup>23</sup> Resistance was light to negligible as the enemy forces retreated into the hills.

The operation was also done according to doctrine.<sup>24</sup> A ten minute prep, blasting all known enemy positions, using CAS, AC 130's, naval gun fire, artillery, mortars, and the two escort Cobras. Miraculously, this bombardment did not injure any of the students or faculty.

What remains unclear is why the Rangers did not move on the Grand Anse campus sooner. After seizing the airfield, they learned that many other students were located nearby. If the task force planned a helicopter operation for the Rangers to execute, then the task force could have taken measures to send some reconnaissance near the LZ to help in targeting.

The students at Grand Anse were in consultation with American forces at Salines and appeared to be in no danger. Discounting what little intelligence was available from the students, the U.S. forces planned an air assault. AAR's reported no reconnaissance on the ground by the Rangers or in the air by the Marines. Therefore, neither force accurately targeted the PRA gunners, even though resistance was negligible. Nevertheless, the assault force fired a short preparation on suspected targets as their form of localized SEAD. While described as a textbook operation, it is fortunate that no student was harmed, considering the attendant political ramifications of such an undesirable event.



#### Mission Five: Raid on the Calvigny barracks

The final heliborne operation was an assault on Calvigny barracks on October 27, 1983. Securing Calvigny fell again on the Rangers, now under the operational control of the 82d ABN. The 82d's Aviation Battalion Blackhawk helicopters arrived in Barbados at the Intermediate Staging Base the previous day. All night the crews reassembled helicopters, then flew the helicopters to Salines. These crews were immediately pressed into immediate fuel resupply missions, due to the severe lack of aviation fuel on Grenada. After these resupply missions, when mission planning finally began in earnest, the Rangers and crews had barely an hour to prepare for the mission.

Again, inaccurate intelligence, no real reconnaissance, and a dogmatic approach to air assault operations created problems. Intelligence suggested that this was a difficult mission with so many enemy troops in the area.<sup>25</sup> Once again the old aerial photos failed U.S. aircrews. The photos portrayed the barracks at the objective as flat. In fact, the barracks were on a 300 meter-high hill. This made most of the initial helicopter crews to miss the LZ completely, thereby forcing them to circle the LZ to land. Small arms were negligible, based on unit AAR's. Some reports say that no fire came from the surrounding area. One soldier lamented, "We didn't find anything worth shooting

at."<sup>26</sup> Regardless, one aircraft was downed, presumably by fire, and during the confusion, two others crashed in the small LZ.<sup>27</sup>

### Command and Control

Disjointed command and control relationships affected SEAD operations. Most of the helicopter missions were ad hoc affairs. There was little coordination between the helicopter forces and ground maneuver forces. While each unit was trained on airmobile operations, there is no evidence of extensive training between aviation and ground forces that performed these missions.

Rehearsals were nonexistent; there was not enough time. Units had as little as one hour to plan before execution. Consequently, infantry and helicopter crews were thrown together for very risky operations, such as direct assaults on top of objectives in broad daylight. With the exception of the Grand Anse raid, the U.S. Army did not conduct these missions very smoothly.

Air assaults, as previously stated, need a high level of precise planning. At the time, the governing manual for airmobile and air assault operations was FM 90-4, Airmobile Operations. In its preface it states,

Airmobile operations have to be conducted with speed, secrecy and precision by a well-trained, highly proficient, combined arms team. To gain that proficiency, individuals and units must train in airmobile operations prior to combat.<sup>28</sup>

In Urgent Fury, most of the heliborne assaults occurred without extensive planning and no combined arms training together. Without this training, the units did not maximize the support requirements for these kinds of operations, such as SEAD.

#### SEAD Solutions

Throughout Urgent Fury, the lack of intelligence and an overdependence on helicopters were the two main reasons for high helicopter attrition rates.

The decision not to take aerial reconnaissance elements contributed to the lack of intelligence. This lack of intelligence translated into a weak targeting system. Consequently, the fire support system became ineffective.

The intelligence void, while not excusable, may be the norm for no-notice deployments such as Grenada. Even if the intelligence was available, dissemination of that intelligence was lacking. In Urgent Fury, all of the helicopter missions began with faulty intelligence, outdated maps, and poor quality, old photographs. As previously described, this intelligence caused helicopter crews to select alternate landing zones at best, or worst case, to miss the LZ completely and attempt another landing after forfeiting surprise.

Air assaults require good intelligence, especially direct assaults on the objectives. It remains a mystery why

commanders did not take reconnaissance measures to gain that intelligence. Given a shortage of cargo aircraft, commanders decided not to take any air cavalry assets to the fight until the mopping up phase. Commanders opted to take the risk of no aerial reconnaissance forces. The commanders still had other reconnaissance forces organic to the infantry that they could task to perform the reconnaissance. Obviously, the commanders elected not to assign ground forces to the task of area reconnaissance near the LZ's. This risk, in hindsight, cost a great deal in terms of helicopters.

Intelligence was not disseminated throughout the task force. Sadly, it seems that no one, the Marines or Rangers, knew that the PRA had destroyed special operations aircraft around St. Georges earlier on the first day. The loss of the two Marine Cobras over Ft. Frederick highlights the apparent lack of knowledge of the ground situation by the pilots.

Also highlighted were some interservice differences in helicopter use. The Marines use attack helicopters not as maneuver but as close fire support. That means, ideally, a ground controller clears the aircraft onto a target with an azimuth, range and general description of the situation. This is a highly controlled environment that most Army units are not trained to do well. The resultant confusion over target locations between the Rangers and Marines, and the tactics the crew felt they were forced to use ultimately led to the crews' death.

Given our doctrine, the Rangers should have provided whatever suppression they could to the Cobras. Because of the traditional use of fires, it meant that some kind of fire support was the only answer. The workhorse for the Rangers is the AC-130 gunship since they have few organic indirect fire assets. This was not available at the time. That is why the task force commander sent the Marine pilots there in the first place.

At any rate, when the first Cobra went down, it became a focal point for all of the PRA gunners. They knew perfectly well that an aerial extraction of the crew was sure to happen. So the PRA gunners regrouped and waited for the rescue attempt. The lone Cobra was simply outmatched by the anti-aircraft fire. The firepower solution, the only one the Army and Marines had, failed.

Similarly, the raid on Calvigny suffered from the same dogmatic approach as the Grand Anse raid. Only the air assault task force commander conducted a cursory reconnaissance. When no resistance was found, the force conducted the traditional prep anyway. They were not taking any chances. Not surprisingly, this prep failed to suppress anything. The enemy was not accurately targeted, and the gun data was completely in error. Most of the rounds fell into the sea, not on the barracks compound.<sup>29</sup>

Crews flew into an LZ expecting it to be flat and suppressed. Instead, they overflew the landing zone on top of

a hill and the intact site. Why was there no reconnaissance made when the LZ was 10-12 kilometers away and the Americans had two and half days before the mission to accomplish the reconnaissance? While the enemy resistance remains in dispute, the undeniable fact is that three helicopters crashed and several people were injured, mainly because of an overreaction to the unknown situation.

The need for speed forced the invaders to use helicopters in predictable and unimaginative ways. As in Lam Son 719, automatic preps and dependence on helicopters stymied problem solving. A helicopter-only direct assault is a high-risk mission when the enemy sits on every key objective, knows U.S. methods, and takes appropriate actions. In Grenada, inaccurate targeting made the firepower solution ineffective. The lack of intelligence and restrictive ROE only exacerbated the problem.

#### Helicopter Losses

The evidence indicates that small arms fire shot down all nine helicopters that were damaged or destroyed in Grenada.<sup>30</sup> Out of the 100 helicopters deployed, the loss rate was nine percent. This loss rate is questionable since in 1984, the Pentagon requested eighteen additional helicopters to make up for the damaged or destroyed aircraft.<sup>31</sup> The high loss rate for three days of combat made critics once again question the utility of helicopter assaults.<sup>32</sup> The Army's

only comment was about the Blackhawk helicopter's ability to withstand fires. It made no comment in this forum about doctrine or procedures.<sup>33</sup>

All of the helicopters shot down were either landing at an LZ or providing suppressive fires on an air defense site. All of the aircraft fell prey to either small arms fire or machine guns. These anti-aircraft weapons, hidden from sight and not emitting any signatures, make detection difficult. Anti-aircraft weapons clustered around a city lessens the effectiveness of suppressive fires. The population becomes a shield, preventing massive firepower from raining down on the enemy.

#### Summary

Operation Urgent Fury was a no-notice deployment. The intelligence picture was sketchy, and the troops were not equipped with the maps to execute the missions properly.

In spite of the lack of intelligence, speed turned into haste. Speed is relative to the enemy's speed. Haste puts forces in unnecessary danger by sending them into unknown situations, often by helicopter. Without reconnaissance on most of the air assaults, direct helicopter assaults proved difficult, even against relatively untrained air defense crews.

U.S. forces underestimated the tenacity of the PRA air defense forces. The main threat to helicopters was the

machine gun. Gunners could easily move the guns, although there is no indication that they relocated the weapons. Without reconnaissance, targeting these weapons for suppression by fire support was almost impossible. Additionally, once the first aircrews targeted these weapons, this information was not passed to the other aircrews. The machine guns in the Fort Frederick/Fort Rupert area claimed the bulk of the helicopter shot down over Grenada.

Artillery was ineffective, and close air support achieved mixed results. While the close air support did eventually suppress the guns, CAS stretched the rules of engagement. Due to confusion, one CAS mission incorrectly fired on a friendly command post, while another hit a mental hospital.<sup>34</sup> Enemy gunners used the hospital for protection, making it a viable military target. In a different scenario, these firepower solutions may be unacceptable, both militarily or politically.

Once again, firepower alone could not suppress enemy air defenses. Without accurate targeting from good intelligence, even the best firepower has limits. However, these limits do not eliminate the need for SEAD. In fact, SEAD requires different solutions, such as avoidance and ground maneuver forces. The Army cannot rely on a suppression by fire support only solution.



## ENDNOTES

<sup>1</sup>Mark Adkin, Urgent Fury: The Battle for Grenada, (Lexington, Massachusetts: DC Heath and Company, 1989), 107.

<sup>2</sup>Adkin, Urgent Fury, 128.

<sup>3</sup>Adkin, Urgent Fury, 163.

<sup>4</sup>Adkin, Urgent Fury, 162.

<sup>5</sup>Daniel P. Bolger, Americans at War, 1975-1986, (Novato, CA: Presidio Press, 1988), 285.

<sup>6</sup>Bolger, Americans at War, 288.

<sup>7</sup>Bolger, Americans at War, 285, 288.

<sup>8</sup>Richard Gabriel, Military Incompetence: Why the American Military Doesn't Win, (New York: Hill and Wang, 1985), 155.

<sup>9</sup>Adkin, Urgent Fury, 164.

<sup>10</sup>Based on a 1986 interview of then Lieutenant General Norman Schwartzkopf on the Public Broadcast System's "Frontline" series. Videocassette 1987.

<sup>11</sup>Adkin, Urgent Fury, 165.

<sup>12</sup>Adkin, Urgent Fury, 151, 158.

<sup>13</sup>Adkin, Urgent Fury, 126.

<sup>14</sup>Bolger, Americans at War, 302.

<sup>15</sup>Gabriel, Military Incompetence, 169.

<sup>16</sup>Bolger, Americans at War, 300.

<sup>17</sup>Adkin, Urgent Fury, 180.

<sup>18</sup>Bolger, Americans at War, 303-304.

<sup>19</sup>Ronald H. Spector, U.S. Marines in Grenada: 1983, (Washington: Headquarters, U.S. Marine Corps, 1987), 10.

<sup>20</sup>Benjamin F. Shemmer, "JCS Reply to Congressional Reform Caucus' Critique of the Grenada Rescue Operation," Armed Forces Journal International, July 1984, 99.

<sup>21</sup>Public Broadcasting System, "Frontline: Operation Urgent Fury".

<sup>22</sup>Bolger, Americans at War, 333.

<sup>23</sup>Gabriel, Military Incompetence, 169.

<sup>24</sup>U.S. Army, FM 90-4, Airmobile Operations, (Washington: Department of the Army, 1980), 4-39. This manual was the current issue during Urgent Fury. It stated, "A known or suspected enemy force, regardless of size, warrants an LZ preparation."

<sup>25</sup>Bolger, Americans at War, 340.

<sup>26</sup>Bolger, Americans at War, 342.

<sup>27</sup>Gabriel, Military Incompetence, 171.

<sup>28</sup>U.S. Army, FM 90-4, i.

<sup>29</sup>Adkin, Urgent Fury, 283.

<sup>30</sup>Shemmer, "JCS Reply" 99.

<sup>31</sup>Time, "Auditing an Invasion" (July 23, 1984), 49.

<sup>32</sup>Shemmer, "JCS Reply" 19.

<sup>33</sup>Shemmer, "JCS Reply", 19.

<sup>34</sup>Bolger, Americans at War, 317, 339.

## CHAPTER 6

### ANALYSIS OF OPERATION DESERT STORM

#### Background

On August 2, 1990, Iraq invaded Kuwait. By doing so, Iraq threatened most of the oil reserves in the Middle East. U.S. President George Bush decided that this invasion also threatened American national interests in the region. As a result, on August 6, 1990, Bush committed U.S. ground forces to deter Iraq from attacking Saudi Arabia. By November of 1990, Bush changed U.S. strategy from defending Saudi Arabia to offensive action against Iraq's army still occupying Kuwait. Consequently, the president ordered the largest commitment of U.S. forces to battle since the Vietnam war. Together with an alliance of several other nations, this large force, known as the Coalition, eventually defeated the Iraqi army occupying Kuwait (See Appendix B: Chronology of Operation Desert Storm).

#### Planning

The final concept for defeating the Iraqi armed forces called for extensive naval, air, and ground operations designed to remove the Iraqi Army from Kuwait (See Figure 4). Coalition forces planned a naval blockade of the Persian

Gulf, and an amphibious feint in the eastern part of Kuwait. An extensive aerial operation would gain air superiority quickly, then the Coalition could begin bombing operations designed to wear down Iraqi forces prior to the ground attack.

Ground operations were equally grand in scale. The plan gave each major unit, aligned from east to west, the following missions. The Fourth Marine Expeditionary Brigade (4th MEB) remained offshore in the Persian Gulf poised for an amphibious assault into eastern Kuwait. This action locked seven Iraqi divisions out of the battle as they defended against the Marine threat floating in the Gulf. The JFC-E, consisting of Saudi brigades, would attack to seize critical coastal road junctions. To the west of them, more U.S. Marines would attack with two divisions through the main border obstacles, destroy forces in zone and seize Kuwait City. Other forces, made up of an Arab coalition, were to the west of the Marines. These units attacked in zone to cut off Iraqis leaving Kuwait City.

The plan was to make the Iraqis believe that the main attack would come from the Marines straight into Kuwait. The actual main attack would come farther west, conducted by the VII (US) Corps. This large, heavily armored corps would skirt most of the Iraqi border defenses some 15-24 hours after the initial attacks. With both flanks protected, the VII (US) Corps oriented on destroying one of Iraq's centers

of gravity, the Republican Guard Forces Corps, (RGFC). The VII (US) Corps, combined with the XVIII ABN, would complete the envelopment and destroy the remaining forces.

In the westernmost zone, the XVIII Airborne Corps (XVIII ABN) would attack in zone, seize key airfields and road junctions, and sever the Iraqi lines of communications along Highway 8. These attacks would occur within a few hours of each other.

### Intelligence

Coalition forces faced an estimated 451,000 soldier Iraqi Army spread over twenty-six divisions (See Figure 5). Operationally, the Iraqis defended in depth. Deployed along the Saudi Arabia-Iraq border, there were lower quality, conscripted units. Iraqi commanders expected these units to slow the Coalition attack long enough for the Iraqi reserves to form a credible counterattack. Immediately behind the conscripts were better quality divisions employed as tactical reserves. Still further north, Iraqi commanders placed the premier Iraqi divisions, the Republican Guards. Based mostly in southern Iraq, the RGFC was the operational-level, mobile reserve.

The RGFC constituted the military power base for the ruling party in Baghdad. Equipped with the best weapons and equipment, their troops were better trained and better paid

than regular Army soldiers. These units spearheaded the invasion of Kuwait in August of 1990.

The Iraqi Army possessed 3790 tanks, 2390 armored fighting vehicles, and 2520 artillery pieces; ranging from antiquated to modern systems such as the T-72 M1 tank.<sup>1</sup> For theater air defense, they had at least fifty fixed and mobile radar systems along the Iraq-Saudi border.<sup>2</sup>

Terrain and weather also caused concern for Coalition planners. The U.S. Army area of operations (AO) consisted of a sand and stone desert. The planners believed that the desert floor would not hinder tracked vehicles, but would greatly restrict wheeled vehicles. Many feared that the attacking forces would outrun their wheeled, logistics lifeline. This problem also included aviation logistics forces. Aggravating this problem was the lack of paved roads, forcing engineer assets to make dirt roads. Desert conditions also worked against the Iraqis. Under constant attack from the air, the terrain forced the Iraqis to move for only short distances at a time. Farther north, the alluvial flood plains located in the Tigris-Euphrates river valley limited traffic to the main roads, particularly Highway 8, leading from Basra to Baghdad. This area also limited large air assault helicopter operations, because the valley floor was largely muddy marshlands for much of the year.

Making matters worse, the worst weather patterns in over a decade sharply curtailed air operations. Frequent sandstorms also limited helicopter operations during daylight hours of the ground attack. At night, sky conditions degraded most night vision devices for aircrews; even FLIR-equipped aircraft such as AH-64 Apaches. While night flying lessens the effectiveness of line of sight systems, such as machine guns and SA-14s, the desert sky conditions made aircrews come into range of these types of weapons.

#### Air Defense

Iraq's air defense arsenal contained 3700 AAA guns larger than 14.5 mm and over 10,000 machine guns ranging in size from 12.7 mm to 14.5 mm. The United States Air Force's Chief of Staff estimated that the Iraqis had more than 17,000 SAMs.<sup>3</sup> Iraqi air defenses worried U.S. planners greatly.<sup>4</sup> A conservative estimate was that over three thousand shoulder-fired SAMs (SA-7, SA-14) were deployed in the Kuwaiti Theater of Operation (KTO).<sup>5&6</sup>

Our greatest concern were the Iraqi shoulder-fired air defense weapons. We could get around the sophisticated, long-range systems by flying at low-altitude and letting ground clutter mask our signature. But with the man-pack SAMs, one person in a hole in the ground can take you out.<sup>7</sup>

#### Maneuver

See Appendix B: Chronology of Operation Desert Storm, for overview of U.S. Army actions.

## Analysis of Helicopter Operations

Army helicopter operations were, like the war itself, extremely successful. While it may be too early to draw many far-reaching conclusions, several trends emerge about SEAD and air maneuver.

The American-led Coalition had a situation tailor-made for its doctrine. Combat operations, for the most part, occurred in the vast featureless terrain. The Coalition maximized its superior technological advantages, enabling Coalition forces could acquire the enemy and engage the enemy at longer ranges. The desert battlefield contained few civilians, allowing maximum firepower to be employed against enemy positions. There were virtually no restrictions to the Army's firepower employment.

This thesis now discusses several key aspects of helicopter operations. It looks at specific aviation operations from January 15 - February 28, 1991, and is confined to selected helicopter operations of the XVIII ABN and VII Corps. Certain missions shed light on the expanding concepts of SEAD and air maneuver. The reviewed missions are:

1. Task Force Normandy's raid on the Nukhayb radar site,
2. Pre-Ground assault day (G-Day) raids,
3. The 101st Airborne's (101 ABN) air assault into the Euphrates river valley,



4. Post-G-Day reconnaissance and attack helicopter missions.

Mission: Task Force Normandy's Raid on the Nukhayb Site

The first selected mission was the raid on Iraqi radar sites on the morning of January 17, 1991. Named Task Force (TF) Normandy, this force played a pivotal role in the opening phases of the campaign SEAD plan. Eight Apache attack helicopters and their crews from 1-101 Aviation battalion and four USAF Pave Low H-53 helicopters from the 20th Special Operations Squadron formed the force. Their mission was to destroy two theater-level, early warning and ground intercept radar sites located just inside Iraqi; creating a radar-free corridor twenty-two minutes before the main Air Force fighters crossed the border.<sup>8</sup>

TF Normandy infiltrated helicopters through enemy defenses, bypassing known or suspected enemy locations. Intelligence indicated that a mission profile altitude of 75 feet or below, combined with an airspeed of eighty knots, would make them almost indistinguishable from ground clutter on Iraqi radar screens.<sup>9</sup> Enemy resistance consisted of sporadic fire along the border. At 0238, January 17, 1991, the task force began to destroy the sites. Within minutes, they destroyed both sites, creating a "radar black" corridor.<sup>10</sup>

For the first time U.S. Army helicopters played a key role in joint air operations. Technology has advanced helicopter capabilities, proving helicopters can accomplish tasks that are unsuitable for fixed winged aircraft. From a SEAD standpoint, this mission was the only time the JFACC tasked regular Army aviation units to a campaign SEAD mission. The Army later conducted other SEAD localized missions using long range artillery, not helicopters.<sup>11</sup>

However, TF Normandy did not use fire support for SEAD during this raid. The task force used excellent intelligence, avoided enemy air defenses, and employed the unit's formidable night flying capabilities to suppress air defenses. No fires were used to create a gap in the defenses. TF Normandy suppressed the air defenses by not giving the enemy good opportunities to fire on its aircraft.

A deep raid of this type required pinpoint accuracy of intelligence and lots of time for rehearsals. For several months, the crews planned and rehearsed the mission. Nearly flawless execution demonstrated that with the proper resources, this kind of raid can be done.

#### Mission: Raids before G-Day

Pre-G-Day Coalition missions were highly successful, and particularly helpful to the Coalition's deception plan. Aviation struck specific targets with well-rehearsed raids against a largely surprised and passive enemy. Their success

depended on few competing demands for resources, and they then unloaded these resources on the unsuspecting Iraqi force.

One such mission was the feint up the Wadi Al Batin to support the theater deception plan. One VII Corps attack helicopter battalion, the 2-6 CAV, executed a well-timed mission on the night of February 16, 1991. Supported by USAF EW aircraft, the SEAD mission effectively suppressed most of the dedicated ADA systems. Army fire support came from five battalions of artillery (an entire division's worth plus its reinforcing complement) shooting into a two kilometer box to obliterate all targets there.<sup>12</sup>

As the 2-6 CAV moved toward the objective area, artillery pounded known and suspected targets along the route. Once the 2-6 CAV's Apache attack helicopter crews destroyed their targets, they returned across the border supported by precisely timed fires that suppressed more targets. Artillery quickly targeted and quickly destroyed an Iraqi air defense radar site.<sup>13</sup>

This feint is one of the best examples of the current SEAD doctrine. Aircraft fly planned missions along prescribed routes with artillery and USAF EW aircraft supporting the helicopters. Units need perfect intelligence, combined with singular support commitment from artillery units, to execute this doctrine. Once the enemy begins to react, will this doctrine remain useful?

Mission: Euphrates River Valley Air Assault

The 101st also conducted the largest single air assault in history. From February 24-25, 1991, hundreds of aircraft sorties maneuvered 100 kilometers deep into Iraq to set up a Forward Operation Base (FOB) named "Cobra." From here the unit conducted a series of attacks cutting off Highway 8, the main road from Baghdad to Basra, and destroying retreating forces northwest of Basra. The 101 ABN initially moved Apaches to dominate Highway 8 by fire, then secured these positions with infantry. Later the attack helicopter units maneuvered deeper to seal off Highway 8 from retreating forces.

The 101 ABN is the only unit in the U.S. Army that can use air assault tactics on such a large scale at the operational level. Helicopters and infantry synchronized maneuver to defeat the enemy. A sizable aerial reconnaissance force led the air assault, clearing a route to the objective<sup>14</sup>. It not only provided enemy intelligence, but also gave weather conditions, forcing postponement of the air assault until the weather cleared. In maneuver parlance, the weather became a surface for helicopter operations. Reconnaissance gave the aviation commanders immediate feedback to avoid this surface.

Dismounted scouts deployed near proposed landing zones around Highway 8. Realizing the area was unsuitable for

large helicopter landings, the scouts marched ten kilometers that night, away from enemy concentrations. This dismounted unit "pulled" the rest of the unit through this undefended gap.

SEAD for these missions was not an artillery affair. The attack was simply too deep. The division had a great number of attack helicopters. The division artillery's limited range made the planners employ attack helicopters and CAS for suppression. The attack helicopter-heavy aerial reconnaissance forces located enemy positions two to three kilometers away from the landing zone, and suppressed the target with direct fires and close air support.<sup>15</sup>

Part of the SEAD plan was avoiding fires. The division accomplished this through a significant reconnaissance effort that provided the commanders with the real-time intelligence they needed. Units made a conscious effort to avoid enemy defenses by flying only forty feet above the ground, and not landing in a "hot" LZ.<sup>16</sup> The importance of FOB Cobra was not its location, but its purpose; to refuel aircraft for deep aerial maneuver into the enemy's rear. By repositioning forces to block Highway 8, the division maintained its flexibility, avoided Iraqis, and thus prevented helicopter losses while still getting the mission accomplished.

### Post G-Day Helicopter Reconnaissance Operations

As the ground war began, almost every division led with some kind of aerial screen or movement to contact. Most divisions followed U.S. doctrine by leading with their cavalry to deliberately contact with the enemy. Within the cavalry organizations, aerial cavalry troops screened to the front, weather permitting. Attack helicopter battalions usually assumed these duties at night.<sup>17</sup>

Typically, these troops screened five to ten kilometers forward of their ground troops. This air-ground team worked together to ensure adequate coverage of the assigned zones. The air cavalry troops covered wide areas ground quickly. The slower, more protected ground troops conducted detailed reconnaissance for the division's trailing brigades. This worked well; not one air cavalry unit lost a helicopter to ground fire in the entire theater. Air cavalry crews, flying in aging, Vietnam-era AH-1 Cobra attack helicopters and OH-58 scout aircraft, make this fact very significant. These scout/attack aircraft teams possessed only the enhanced optics of the AH-1 to find the enemy.<sup>18</sup> Without any thermal or FLIR imaging available, most of their missions were in broad daylight, making them very susceptible to all weapon systems.<sup>19</sup>

The Second Armored Cavalry Regiment (2ACR) employed similar, but more ambitious reconnaissance methods. As the VII U.S. Corps covering force, the mission of the 2ACR was to

destroy quickly or bypass enemy forces and locate the Republican Guard. The regiment pushed the Fourth Squadron's (Air Cavalry) moving screen out twenty to thirty kilometers in front of the main body of the regiment. Air squadron troops found many battalion-sized elements and fixed them with fires until the ground squadrons could attack. This enabled the ground squadrons to maintain a high offensive tempo and arrive at the fight in battle formations. The air squadron worked well with these ground squadrons, much like the smaller divisional cavalry squadrons had.<sup>20</sup>

#### Attack Helicopter Operations

Once the ground attack started on the 24th of February, the divisions nearly abandoned the traditional deep attack planning scenarios envisioned in army manuals.<sup>21</sup> Only a few attack helicopter battalions flew these kinds of deep attacks, primarily on the last two nights of the ground war because of the support and planning requirements to conduct such an operation.<sup>22</sup>

With units crumbling and friendly forces in pursuit, commanders began to use attack battalions in reconnaissance in force roles. These kinds of attacks prevented the enemy from detecting or reacting to the rapidly advancing divisions.<sup>23</sup> Depending on the commander's intent, these units conducted guard or reconnaissance in force missions in front of the divisions. "Armed reconnaissance and contact with

enemy forces provided many tactical commanders the only true pictures of target areas and battlefields."<sup>24</sup> These units launched deep attacks without the "perfect" intelligence that they had grown accustomed to in peacetime.

Perhaps Major General Griffiths of the 1st Armored Division put it best by saying during the battle, "I don't want a single minute to go by without Apaches in front of the Division."<sup>25</sup>

#### Fire Support and SEAD solutions

Before the ground attack, SEAD operations appeared to follow doctrine closely. They were largely successful. Why?

#### Campaign SEAD Plan

One reason was that the air operations plan was very comprehensive. Phase II of air operations was to destroy and neutralize enemy air defenses and command and control support.<sup>26</sup> Controlled by the JFACC, all services contributed to the effort.<sup>27</sup> Designed to assist mainly fixed winged aircraft, the campaign SEAD made short work of the strategic and theater level air defenses.

Campaign SEAD, assisted by the Army on a mission-by-mission basis, did not directly help helicopter operations. The Air Force even admits its shortcomings. While the jets roamed high over the battlefield for most of the operation, their losses increased significantly when flying lower to directly support ground forces. Out of the 15 Coalition



aircraft shot down by AAA and SAMs, the Iraqis downed eight in the last week of the war.<sup>28</sup>

Not until the final few days of the war (23-28 Feb) did air operations move down into lower altitudes and the higher threat posed by Iraqi battlefield defenses (hand-held IR SAMs and small caliber AAA ...) and aircraft losses increased.<sup>29</sup>

#### U.S. Army SEAD operations before G-Day

Since the Iraqi Army displayed little initiative or willingness to take risks, they remained largely in place. This created extremely long periods of time (dwell time) for the targeting cells to accurately pinpoint ADA systems. The 72-hour planning window that a Corps uses for these types of attacks was ample time to coordinate all of the agencies into the missions.

Long planning times also let the Corps staffs request J-SEAD support, usually USAF electronic warfare aircraft. It usually takes 48-72 hours from the time request to the conduct of these missions<sup>30</sup> due mainly to the scarcity of dedicated aerial EW platforms. This almost ensured that the Air Tasking Order (ATO) contained the J-SEAD missions to support these helicopter operations.

#### Targeting

After G-day, aviation operations and SEAD support underwent a dramatic change. Targeting became difficult in such a fluid situation. This was primarily due to a breakdown in intelligence and targeting systems at the Corps

and Division levels. The doctrine of accurately detecting the enemy primarily by technical means unraveled. The doctrine implies that technology can accurately target enemy formations and weapons. Even in the desert, where there are few limitations in visibility and acquisition, the commanders felt that their intelligence needs were unmet at Corps and below.<sup>31</sup> In this new age of precision weapons, exact targeting information is more critical.

They [the commanders] required much more specific intelligence than ever before, driven in part by the burgeoning information required to fully apply precision weapon systems in an offensive operation.<sup>32</sup>

To get this information, the U.S. Army relied on many devices; from JSTARS (Joint Surveillance Targeting Attack Radar System) to space satellites. Commanders limited the use of scouts before G-Day because they felt that their use would compromise the deception plan.

All of this technology has its limitations. Satellite photos can target something within 400 meters; the problem is that artillery usually needs accuracy within 100 meters for effect.<sup>33</sup> JSTARS can detect moving targets, but its information is very time sensitive.

Despite having control of the air, and complete mastery of electronic, communications, and signals intelligence, the Iraqis remained largely hidden for precise targeting. One author and ODS veteran writes, "The dispersion and static nature of Iraqi forces in Operation

Desert Storm make it difficult to locate viable targets."<sup>34</sup> Another author concluded, "There is still a problem with finding targets in the first place. The potential targets had a lot of places to hide, considerable resources to assist them, and a powerful incentive to stay under cover."<sup>35</sup>

Even in the U.S. Army's own accounts of ODS, Certain Victory, it admits, "VII Corps was never able to determine accurately how many tanks and artillery pieces remained in its path."<sup>36</sup>

All of this confusion betrays the clean, sanitized version of the war as seen by the American public. Confusion required scouts to find the enemy so those positions, including ADA, could be destroyed. "But all this (technology) was not enough, as only someone on the ground could confirm the damage."<sup>37</sup>

The tempo of operations accelerated well ahead of schedule. Enemy units surrendered or got overrun so quickly that the peacetime doctrine could not keep pace. Division commanders needed information quickly, and many assets were failing to distribute real-time intelligence.

Compounding the problem of support, aviation conducted deep zone reconnaissance, well outside the range of most conventional tube artillery. Aircraft missions operated well inside a 12-24 hour window from warning order to execution. It was not uncommon for attack battalions and air cavalry to launch attacks with two to three hours' notice. With these

kinds of planning times, the pace of operations simply outran most fire support systems.

To compensate for the artillery's short range, a large portion of the "push CAS" sorties were given to these deep operating units. While effective, this too proved problematic. The USAF invented a system of "kill boxes". These 30-mile boxes, at specific latitudes and longitudes, defined the hunting ground for Air Force aircraft. Sorties were sent to a box to destroy enemy forces there. In Desert Storm, the campaign J-SEAD was well planned and well executed. It allowed the aircraft to fly above the effects of small arms fire and most AAA.

If the existing system had problems, why were Iraqi anti-aircraft systems so ineffective? Certainly, the Iraqis had the equipment and used it on occasion. There is little doubt that the air campaign played a key role in the operation. It wiped out the highly centralized command and control of the Iraqis, and effectively suppressed the high and medium air defense systems. As air operations continued, the Coalition air forces lost fifteen aircraft, mostly to AAA and IR (heat seeking) SAM's. Even by official accounts, "SEAD can reduce, but not eradicate, these threats."<sup>38</sup>

#### Command and Control

The Air Force suffered more losses in the last week of the war than the U.S. Army. One reason why was that Army

helicopters are more integrated into the Army's maneuver scheme at Corps or Division level than the Air Force; because the Army used its aviation forces as maneuver elements. This "synergy," as the Army calls it, affords better protection for helicopters. This synergy requires more coordination because maneuver now had a height dimension. In previous conflicts, aviation supported the ground battle with different controls in place. These additional demands stressed the communications structure of the division. It was common for aviation operations to occur at the outer limits of a division or corps' area of operation.

Once the ground war began, strained communications caused problems in coordination between aviation and ground maneuver units. For instance, to "deconflict" missions, one attack battalion had to coordinate with three divisions and an ACR on their impending attack.<sup>39</sup> This was well beyond the capabilities of the battalions. Its parent brigade also experienced coordination problems.<sup>40</sup>

Despite the problems, coordination within divisions was adequate for the task. There is also no evidence that the Iraqi Army interrupted command and control with jamming or interdiction. Consequently the enemy did not severely test the systems of control, and units overcame their difficulties. In general, command and control worked well. Adequate command and control helped Coalition units

steamroller their opponent by an unending string of attacks, each becoming more life threatening than the previous one.

In both U.S. Corps, the scenario went something like this. After the aerial bombardment, and knowing that the USAF could not maintain constant pressure on all of their units, Iraqi formations went back to doing their work of improving positions. During the ground war, the Iraqis became complacent, not expecting any ground attack to follow these air attacks. They were wrong. A division leading with its attack helicopters would find, fix, and sometimes destroy these units. Apaches or Cobras lingered in the area, exerting constant pressure on the Iraqis. Once the supporting artillery was set, it suppressed any requested targets from the air crews. Ground units already in attack formations, then destroyed the unit.

Sometimes the most effective SEAD is a ground maneuver unit physically overrunning the gunner's position. As units collapsed, panic spread throughout the command. Anecdotal accounts reported that more systems were abandoned than destroyed. An abandoned system is the best form of SEAD. "Fighting units fail when their will is broken."<sup>41</sup>

#### Helicopter Losses

The U.S. Army lost five helicopters to combat.<sup>42</sup> Of all of the engagements, only one is believed lost to anti-

aircraft (SAM) fire.<sup>43</sup> All other aircraft were shot down by small arms fire or AAA.

Based on the other case studies, U.S. forces would have had helicopter losses around 10-20% of the force. A conservative estimate was that at least 600 helicopters faced probable enemy positions and fire at some time in the operation. This makes a loss ratio of less than 1 percent of all helicopters on combat missions.

Again, all-arms defenses proved to be the most fatal to helicopters. This fact, however, may not be entirely conclusive. Given the massive campaign SEAD plan, the Iraqi radar operators were reluctant to turn on their radar systems that provided them critical early warning.

It does indicate that the all arms defense, and the machine gun in particular, remains a very important weapon against helicopters. The Iraqi Army deployed over 10,000 machine guns in the KTO. They were too many to target and suppress by fires alone.

### Conclusions

Desert Storm suggests that, in spite of the problems cited above, the Army's Airland operations doctrine was valid. Encouraged by the success of using helicopters as maneuvering forces, the aviation branch is redefining its role on the battlefield.

While SEAD doctrine, as a whole, appears validated, a closer look is needed. One must take care not to draw too many conclusions from a lopsided victory. The Coalition pummeled a docile enemy for thirty-seven days before a ground offensive began. This air operation set the conditions for the land battle by decimating Iraqi command and control, neutralizing theater air defenses, and seriously limiting their ground mobility.

This army, strategically locked in place, took a severe beating. Yet for all of the tactical and technological advantages enjoyed by the U.S. Army, its localized and complementary SEAD doctrine failed to keep pace with ground operations. A high tempo of operations, and ad hoc planning in some cases stretched communications.

These shortcomings did not severely affect combat operations, because the Iraqi Army was already battered. While some Iraqi units fought valiantly, if vainly, they never seriously challenged air maneuver doctrine or the U.S. Army's stretched localized and complementary SEAD.

Dedicated ADA systems were not factors to air maneuver organizations. All arms were the most effective weapons. The collapse of the Iraqi Army also caused the collapse of their tactical ADA system.

Current SEAD doctrine worked under certain conditions. In planned and rehearsed missions, when targeting is accurate, artillery is an excellent suppression system in



planned operations. However, when forced to adjust quickly, field artillery cannot react as fast as the enemy gunner does.

Avoidance was an obvious suppression option. By having flexibility to move objectives, units avoided fires. Reconnaissance played a large role in avoidance as well as targeting. A tight cohesion between air and ground maneuver forces complemented the strengths and limited the weakness of each system.

Airland battle doctrine gave the commanders a three dimensional outlook on the "mid-intensity" battlefield. A SEAD doctrine must capitalize on the commander's vision of this extending battle space.

## ENDNOTES

<sup>1</sup>Robert H. Scales, Certain Victory: The U.S. Army in the Gulf War, (Washington D.C., U.S. Army, 1993), 144.

<sup>2</sup>James F. Dunnigan and Austin Bay, From Shield to Storm, (New York: William Morrow and Company, 1992), 147.

<sup>3</sup>Jeffrey Record, Hollow Victory: A Contrary View of the Gulf War, (Washington: Brassey's (US) Inc, 1993), 58.

<sup>4</sup>Scales, Certain Victory, 116.

<sup>5</sup>Department of Defense, "Conduct of the Persian Gulf War" Pursuant to Title V of the Persian Gulf Conflict Supplemental Authorization and Personnel Benefits Act of 1991. (Public Law 102-25), 107.

<sup>6</sup>Author estimated that one-third of the Iraqi total tactical air defense systems deployed to the KTO. This number is estimated at a ratio of 3:1. This ratio is based on the total number of the Iraqi AAA in their arsenal versus the number deployed in the KTO. Applied the same ratio to shoulder-fired SAMs.

<sup>7</sup>Stan Morse, ed., Gulf Airwar Debrief, (London: Aerospace Publishing, 1992) 160.

<sup>8</sup>Richard A. Cody, "Task Force Normandy" Defence Helicopter, Spring Supplement, 1992, 10.

<sup>9</sup>Cody, "Task Force Normandy" 9.

<sup>10</sup>Cody, "Task Force Normandy" 11.

<sup>11</sup>Scales, Certain Victory, 192.

<sup>12</sup>Scales, Certain Victory, 204.

<sup>13</sup>Scales, Certain Victory, 204.

<sup>14</sup>Morse, Gulf Airwar Debrief, 174.

<sup>15</sup>Scales, Certain Victory, 219.

<sup>16</sup>Morse, Gulf Airwar Debrief, 160.

<sup>17</sup>Scales, Certain Victory, 224, 243, 256.

<sup>18</sup>Frank Colucci, "Snakes Still Strike" Defense Helicopter, (October-November, 1993), 11.

- <sup>19</sup>Scales, Certain Victory, 366.
- <sup>20</sup>Author's personal experience as commander of P Troop, 4/2 ACR.
- <sup>21</sup>Randy C. Nelson, "The Combat Use of Apache Helicopters in the Kuwaiti Theater of Operations: Effective or Not?", 1993 MMAS Thesis, 50.
- <sup>22</sup>Thomas A. Kearney and Eliot A. Cohen, Gulf War Air Power Survey, (Washington: Government Printing Office), 112.
- <sup>23</sup>Scales, Certain Victory, 365.
- <sup>24</sup>Nelson, MMAS Thesis, 48.
- <sup>25</sup>Marshall T. Hillard and Daniel J. Petrosky, "An Aviation Brigade goes to war" Aviation Digest, (September-October 1991), 60.
- <sup>26</sup>Department of Defense, "Conduct of the Persian Gulf War" 119.
- <sup>27</sup>Kearney and Cohen, Gulf War Air Power Survey, 240.
- <sup>28</sup>Department of Defense, "Conduct of the Persian Gulf War" 203.
- <sup>29</sup>Department of Defense, "Conduct of the Persian Gulf War" 203.
- <sup>30</sup>Kearney and Cohen, Gulf War Air Power Survey, 150.
- <sup>31</sup>Scales, Certain Victory, 163.
- <sup>32</sup>Scales, Certain Victory, 163.
- <sup>33</sup>Scales, Certain Victory, 204.
- <sup>34</sup>Nelson, MMAS Thesis, 48.
- <sup>35</sup>Dunnigan and Bay, From Shield to Storm, 162.
- <sup>36</sup>Scales, Certain Victory, 206.
- <sup>37</sup>Dunnigan and Bay, From Shield to Storm, 153.
- <sup>38</sup>Department of Defense, "Conduct of the Persian Gulf War" 181.

<sup>39</sup>Scales, Certain Victory, 289.

<sup>40</sup>Scales, Certain Victory, 287-290.

<sup>41</sup>Scales, Certain Victory, 368.

<sup>42</sup>Bert Kinzey, The Fury of Desert Storm: The Air Campaign, (Blue Ridge Summit, PA: TAB Books, 1991), 155.

<sup>43</sup>Department of the Army, "Operation Desert Storm Lessons Learned: Volume IV" (HQDA, ADCSOPS-FD, NOV 1993), IV-1-27.

## CHAPTER 7

### CONCLUSIONS AND RECOMMENDATIONS

This Chapter answers the three main questions of the thesis. Each question is answered individually for the sake of clarity. Both subordinate questions are answered first, then the thesis question is answered.

#### What impact does air maneuver have on Joint SEAD Doctrine?

Air maneuver has little impact on current J-SEAD doctrine. In a theater of operations, the JFACC gives the Army or the Land Component Commander airspace control below a coordinating altitude, giving the land force freedom to control its organic aviation. Using this arrangement, air maneuver is entirely in the hands of the Army. If these arrangements continue in the future, then air maneuver's impact on J-SEAD is minimal.

If the JFACC or the theater Commander in Chief (CINC) decides that helicopter forces come under the control of the JFACC, then air maneuver doctrine is most affected. Helicopter missions would be controlled like fixed winged aircraft, with all of the attendant control measures. This

places helicopters in the air domain, not in the ground environment. It becomes the antithesis of air maneuver.

If this happens, then the helicopter loss rate is likely to increase. The helicopter would lose its natural connection with the ground forces that it maneuvers with. As we have seen in the case studies, helicopter units need tight coordination with the ground maneuver forces to successfully survive. Being controlled like a jet would disconnect them from one of the main elements of successful SEAD, the ground force.

The Army should not modify existing J-SEAD doctrine to reflect emerging air maneuver doctrine. Instead, the Army needs to outline a separate force-protection doctrine for air maneuver. The conclusion remains that rotary-winged and fixed-winged aircraft operate in two distinctly separate profiles. J-SEAD doctrine seems to adequately address the fixed-winged profile. The Army needs to address the rotary-winged SEAD requirements, then incorporate them into joint doctrine.

#### What are the SEAD requirements for air maneuver?

This thesis identifies several SEAD requirements for air maneuver. Each requirement is discussed separately under planning, intelligence, enemy air defenses, fire support, maneuver, and command and control.

## Planning

The SEAD planning requirements consist of two parts: suppressive fires, and avoidance of enemy fires.

To begin, SEAD requires an expansion to the definition of suppressive fires. We have seen that without accurate targeting, intelligence, and preplanned missions, indirect fire is of little use to a unit employing air maneuver. Artillery cannot react quickly enough to fulfill complementary SEAD requirements.

The payoff of indirect fires on suspected targets rarely equals the cost in time or ammunition. Massed fires, accurately targeted, can devastate an enemy. However, these kinds of targets are hard to come by on the battlefield. SEAD planning should acknowledge these shortcomings of indirect fires, while maximizing the massing effect that artillery provides.

Expanding suppressive fires into the direct fires yields some answers. Dispensing with conventional SEAD doctrine, we see that direct fires are excellent SEAD, if properly applied. In Desert Storm, the synergy of air and ground forces kept overall attrition of helicopters extremely low. Helicopters found units, so that ground maneuver forces could finish them off. Rapidly advancing ground forces destroyed the cohesion of enemy air defenses.

Grenada provided an excellent case study for this idea on a smaller scale. The Marine landings at Pearls shows how

other units can fill the shortcomings of indirect fire support. Cobra helicopters initially suppressed known machine gun positions. Once the Marine infantry was on the ground, it swept the Grenadian gunners from the higher ground. Ground maneuver forces provided the proper overmatch of hard-to-target, anti-aircraft positions.

The next area of SEAD planning is avoidance of enemy fires. History indicates that direct helicopter assaults on enemy positions are extremely risky operations. These operations require excellent intelligence, careful timing, and almost total surprise. Each case study indicates that the frictions of war work against the helicopter force as it strives to attain these goals.

The best way to avoid enemy fires is to build a certain degree of flexibility into the plan. The 101 ABN assault into the Euphrates valley shows that good reconnaissance and a clear commander's intent helped the division avoid enemy anti-aircraft fires and accomplish its mission. However, sometimes the terrain or events do not allow much flexibility. Units gain this flexibility through reconnaissance and security operations.

The Laotian terrain limited US/ARVN air assault options during Lam Son 719. Because of this, and a lack of aggressiveness from the ARVN armored column, the NVA unhinged the entire plan. Also, Grenada is a classic case of how speed can turn into haste. Units were flung into landing



zones with little intelligence and they lost all surprise by rigidly adhering to doctrine. A lack of planning flexibility leads to high helicopter attrition rates.

### Intelligence

Not surprisingly, a lack of intelligence also caused high attrition rates. Intelligence helps SEAD by avoiding fires and uncertainty. In maneuver terms, it finds the gaps between the surfaces.

In the case of SEAD, enemy fire is a surface. With a certain degree of flexibility, the reconnaissance pulls the helicopter unit through the gap in air defense coverage. The 101 ABN air assault into Iraq is a good example of how their aviation brigade planned a significant aerial reconnaissance effort to clear the air routes and secure the landing zones. These actions prevented enemy fires from striking the aircraft.

Not all reconnaissance has to come from aerial reconnaissance units. In that same air assault, scout platoons in the 101 ABN warned of unsuitable landing sites, and moved the landing zones. A SEAL team warned the Marines on Grenada to land away from Pearls airstrip to avoid ground fire.

Sometimes units had to create gaps. Routinely, in Lam Son 719, the 2-17 CAV targeted and suppressed enemy gunners around the landing zones. While not the best solution, it

alleviated helicopter losses. The 2-17 CAV could accurately target gunners, and with organic systems immediately suppress them. If needed, the 2-17 CAV applied effective fire support based on accurate targeting.

Few ground commanders would lead their battalions down a trail without adequate reconnaissance. Aviation units need to employ the same planning criteria for effective SEAD and fewer losses.

### Enemy Air Defenses

Over a twenty year period, from 1971-1991, air defenses underwent a dramatic change. With the computer age and improving technologies, air defense systems became more sophisticated. This changed Army thinking about weapon system lethality as it applied to helicopters.

Surprisingly, the most lethal system, the machine gun, underwent little change. As an anti-aircraft weapon, armies mounted the system on vehicles, gave it more barrels, and added improved fire control systems. Despite these improvements, it still was the same gun with the same range limitation of the original version.

Machine guns are relatively inexpensive to buy and operate. This resulted in this weapon's widespread use. Every army has many machine guns in various forms. Machine guns are simple and require no specialized training. The gunner can quickly differentiate between friend or foe,

especially when the gunner's country has few aircraft, cutting down on identification times. Machine guns also have small signatures, giving their crews the ability to site the weapon almost anywhere, and making targeting difficult.

Since this study is limited, and the conclusion that the greatest helicopter killer is the machine gun, may skew the results. There is considerable literature about the phenomenal success of shoulder-fired SAMs against helicopters in the Soviet Union's war in Afghanistan.

There is no doubt that the arrival of SAMs on that battlefield changed the dynamics of combat in Afghanistan. This is particularly true of the shoulder-fired, Stinger Infrared (IR) missile. Within a year after its arrival, it made the Soviets severely curtail their helicopter operations. Many scholars believed that Stingers killed most of the helicopters that year.<sup>1</sup>

When one reviews other factors leading to helicopter losses there, a different picture emerges. Afghan rebel units employed the Stinger, forcing Soviet helicopter crews to use terrain flight and conduct night operations, which limited the Stinger's effects. The helicopter crews were untrained for this style of flying. Soviet helicopters lacked the needed power to perform terrain flight, especially in the mountainous regions of Afghanistan. These two conditions combined to send the Soviet helicopter accident rate soaring.<sup>2</sup>

Terrain flight forced the helicopters into machine gun and all arms range. While the Stinger had a great effect on Soviet helicopter operations, the weapon had a lower effect than originally thought. All arms air defense fires continued to destroy the most helicopters.

Regardless, both systems remain a difficult targeting problem. They are very small, easily hidden, and very plentiful on the battlefield. With the U.S. Army doctrine of firing mainly on high priority targets with massed fires, these systems are usually untargeted. Consequently, they must be suppressed by other means.

#### Fire Support

The Army's current solution to SEAD is fire support. The study shows that to truly suppress air defenses, a broader view must be taken. The major problems with relying on fire support alone to suppress enemy air defenses lie in the areas of targeting and the fire support system itself.

Targeting the main threats to air maneuver units is extremely difficult. Most artillery systems cannot suppress the target without accurate targeting within 100 meters. This forces a commander to make two choices. He can either shoot or not shoot artillery. If he does not shoot artillery because of inaccurate targeting, he gives an enemy air defense gunner a chance to shoot first or move from the area. The gunner's ability to move quickly out of the area is

called a short dwell time. In Laos, the gunners' dwell times were so short that they were able to shoot at incoming helicopters and move quickly from the scene before firepower was brought to bear against them.

The other option is to shoot at suspected targets and hope to achieve some suppression. This type of approach uses great amounts of ammunition. It also requires very permissive rules of engagement to shoot at all. In Lam Son 719, and Operation Desert Storm these two factors were not significant. However in Grenada, these factors could have been counterproductive due to ROE and collateral damage concerns.

The fire support system works against responsive SEAD. A study conducted by the U.S. Army that established qualification standards for air defense gunners concluded that the average air defense gunner could acquire, identify, and engage hostile aircraft in nineteen seconds from first sighting.<sup>3</sup> If the gunner is well-trained and his Army has few helicopters (thereby cutting down of identification time) this time could be significantly less. It took between two to eight minutes to engage a target with artillery in Vietnam. Obviously, the time between being engaged and getting field artillery suppression is the critical time for a helicopter crew.

The field artillery engagement times are only part of the problem. In populated areas, where concern for

collateral damage is high, the clearance of fires may take even longer. In Grenada, a brigade commander had to approve all fires, extending the clearance time considerably.<sup>4</sup>

Other fire support options help reduce the time between a normal fire mission and steel impacting on the ground. Precision Guided Munitions (PGM) significantly enhance the artillery's ability for first round suppression. However, the observer and the guns must satisfy specific parameters before firing, such as having the proper codes, weather conditions, and the relative angles between the observer and the guns. While these parameters are solvable, the employment of these weapons needs coordination and they can be of limited use in certain situations, such as employment in cities or jungles.

Close air support is a valuable SEAD asset for air maneuver units. However, they have their own, somewhat different SEAD requirements. Desert Storm showed that fixed winged aircraft were at most risk when entering CAS bombing and strafing profiles. CAS may actually increase the SEAD requirements, depending on the threat.

Targeting methodology also needs review. The methodology itself is not at fault, it is the execution. Machine guns and shoulder fire SAM's make the detect phase of D3 very difficult. The methodology looks at enemy high payoff targets. Machine guns do not usually make the list. If the enemy loses a few machine guns, it may not

significantly alter his plan. However, the case studies show that a few well-placed machine guns can wreak havoc with U.S. Army plans. Given the artillery targeting methods and their doctrinal employment of massed fires, it is doubtful that the philosophy would change, but in certain conditions targeting needs changing.

Field artillery for air maneuver should fire massed missions on accurately targeted weapons. Since radar-guided systems have not significantly effected helicopter operations, one would conclude that targeting these systems is wasteful. This is a short sighted view. Targeting these systems allows more effective use of other fire support assets such as CAS to assist in helicopter operations. Many of these systems can be suppressed effectively with non-lethal fires such as electronic warfare jamming.

What to target and when to target systems is always dependent on the situation. However, only targeting dedicated ADA is not the most effective SEAD in all cases. There are times when air maneuver units must find other solutions to defeat the greatest threats to them. Not all SEAD involves indirect fires.

#### Maneuver

The definition of air maneuver is sound. The literature suggests that the Army needs a clearer definition of aviation's role on the maneuver battlefield. The two main

assets of aviation are speed and agility. Air maneuver units must use these assets to overcome their lack of protection from all arms. SEAD must provide responsive support that accentuates speed. The new maneuver doctrine should highlight this.

The ideas of the indirect approach and finding gaps are tailor-made for air maneuver and this thesis' expanded SEAD definition. Air maneuver uses speed to overcome its protection disadvantage. Its speed differential, compared to other maneuver systems, helps effectively use the indirect approach. Any additional time spent on finding the gap, or "taking the long way around" can many times be made up for with speed.

Direct assaults on enemy positions limit the speed advantages of the helicopter, since it must slow to land. During this phase, helicopters are most vulnerable. Rarely does a direct assault gain positional advantage on a dug-in and waiting enemy, especially in daylight. Also no matter how much maneuver a unit employs, if it lands on top of the enemy, it forfeits its ability to alleviate the effects of enemy air defenses.

It appears that if a helicopter force contemplates a direct assault, the helicopter force should take whatever action necessary to draw attention away from the assault objective. Actions such as landing in several locations, or employing a ground supporting attack, might force the enemy a



into a dilemma and thus provide the helicopter force with options. With more options, the helicopter force commander can shift his main effort, if needed. Shifting the effort helps the force apply leverage on the enemy, putting his air defenses at a disadvantage.

On the larger scale, the Army should consider maneuver in the battlefield's height dimension as well on the ground. Maneuver units need a combined arms approach to survive on the battlefield. Designed to protect the maneuver element's limitations, combined arms enhances the superior qualities of the maneuver arm.

When a large unit conducts a mission, the commander designates one of his subordinate units as the main effort. The other formations support it. These supporting efforts focus on completing their assigned missions to make the main effort successful. The main effort accomplishes the key tasks for the whole unit.

A similar approach should apply to air maneuver as well. If the aviation unit is the main effort, then the other supporting units must accomplish their tasks with an eye toward making the aviation unit successful in accomplishing the main task. For instance, an armored brigade may launch a supporting attack to defeat an enemy force that may have otherwise hindered the aviation unit's mission. By destroying this enemy unit, the armored brigade accomplishes highly effective SEAD. Specific targeting is

not required, the immediate suppressive qualities of a Bradley or M1 tank are more than adequate to the task.

The idea of using a ground maneuver unit in a supporting role is not conventional. But as we saw in Operation Desert Storm, the suppressive effect of ground maneuver is very credible. Something can be said for a ground force being close to the enemy air defenses. If the enemy gunner shoots, he stands a good chance of being killed or suppressed by the ground force. If he hides or moves, then he is still suppressed.

Normally, the aviation force is a supporting effort that shapes the ground close fight. As the supporting effort, the aviation unit may not be the beneficiary of large volumes of support, especially fire support for SEAD. Aviation units may have to accomplish supporting missions in unorthodox ways. They might conduct feints or deceptions to draw enemy gunners away from the main aviation effort. They may have to infiltrate units through enemy lines to accomplish the mission. Any option that gains a freedom to maneuver is effective. Traditional ideas of blasting a hole in defenses with artillery and having that wall of artillery steel roll forward with the helicopter advance are unrealistic in most cases, and well beyond the capabilities of most field artillery systems. In a supporting effort, this steel wall may be impossible to achieve. A supporting effort may eliminate the firepower solution, but it does not

eliminate the requirement for SEAD. The Army needs other methods.

### Command and Control

In a maneuver battlefield, there are always better ways to control forces. As we have seen, early planning, accurate intelligence, and responsive suppressive fires all contribute to effective SEAD. We have also seen that faulty planning and weak command and control work against the air-ground synergy so vital to an air maneuver unit's survival. The less synchronized the plan, the more helicopter attrition rises.

The current system of airspace control called Army Airspace Command and Control (A<sup>2</sup>C<sup>2</sup>) is cumbersome and unworkable in a maneuver environment. By design it helps aircraft, especially fixed-wing aircraft, to avoid collisions with other airspace users. While allowing relative freedom, these measures are very restrictive and reduce the capabilities of tactical helicopter flight.

Since Vietnam, unit planners have approached the problem of "airspace deconfliction" by allocating a "box" of protected airspace for aircraft. An aircraft theoretically can fly in that box unimpeded, as long as it remains in that box. This solution works well in the corps or division rear with helicopters on service support missions.

It does not work well in maneuver. Maneuver requires a flexibility that the current A<sup>2</sup>C<sup>2</sup> does not provide. Trying to impose these outdated solutions on aviation maneuver is counterproductive. Maneuver units use mission tactics, letting subordinates make employment decisions. Lower-level commanders lose flexibility if the route or airspace restricts their movement. Maneuver units, either air or ground, must use the same terms, graphics, and techniques. Helicopters units should operate with positive control measures. Procedural measures, just like the fire support measures, do not react quickly to the changing battlefield conditions. The same control measures that broke down in Laos are still used today.

The firepower solution requires some control measures. Normally a planner superimposes a box of airspace called an Airspace Control Area (ACA) over the axis. The ACA has specific dimensions, altitudes, and times in effect. The safety of aviation is thought to be increased in the box.

Safety is a relative term. By forcing the aviation unit into the ACA at the risk of losing fire support, the commander loses a great deal of flexibility derived from any last minute reconnaissance.

If helicopters maneuver under 100 feet from the ground, is an ACA necessary? At that altitude, it appears that the restrictive measure is unnecessary. Contour-flying helicopters need only the knowledge of the artillery firing

positions, and the location of the target area. If a unit needs degree of safety, then a buffer zone around the artillery unit is a better solution.

Instead of a rigid set of control measures, the Army needs a better aviation command and control support structure more closely integrated with fires. In World War I, artillery support to the infantry suffered from excessive rigidity. The machine gun had made direct infantry assaults on enemy positions very costly. Commanders of that era tried to solve the problem by synchronizing an artillery barrage with the infantry's forward attack. Generally these operations ranged from limited successes to complete disasters.

Units tried massive bombardments and "creeping fires" on suspected targets as the infantry advanced. These attacks generally failed because of the artillery's limited range and the infantry's inability to coordinate with the guns.<sup>5</sup>

Later in World War II, the U.S. Army devised a system that integrated observers, communications, and fire direction. "Fire direction centers gave the U.S. Army a new and unprecedented degree of infantry-artillery integration."<sup>6</sup> One of the U.S. Army's strengths at the time was the ability to mass fires quickly on targets of opportunity.

In many ways, today's SEAD doctrine mirrors the World War I model. Extended communications and tube artillery's limited range forces many aviation operations to depend on

precise timing and perfectly coordinated actions. In Desert Storm, stretched communication and limited artillery range made fire support ineffective for deep air maneuver. Historically, the frictions of war work against precise timing on the battlefield. Aviation is much like the infantry in World War I; it is boxed into a route of advance, unable to change the plan during execution.

Air maneuver needs a revolutionary change in the system of fire support and communications, similar to the changes in World War II, that takes advantage of the speed and agility of helicopter units. Perhaps a more hardy system of staff integration and communication can overcome these problems.

This thesis recommends that an experienced aviator be permanently assigned to a ground maneuver brigade staff. This not only would assist in planning, but could be a focal point for control. This officer would also need a significant long-range communications capability to integrate with the division's aviation liaison officers in the other maneuver brigades. By establishing a responsive, flexible system of positive control, helicopter attrition should decrease.

Similarly, ground maneuver representatives should integrate into the aviation brigade staff. Linked with the proper long-range communications, these representatives could

ensure planning integration by coordinating all four dimensions of battle space.

Does current SEAD doctrine support U.S. Army air maneuver at Corps and Division level?

Current SEAD doctrine does not fully support U.S. Army air maneuver doctrine. SEAD doctrine is too limited in its approach. Currently, SEAD is nothing more than fire support for aviation operations.

The "fire power only" solution's main weakness is responsiveness. This is caused by targeting difficulties, battlefield tempo and clearance problems. In situations where the command inserts restrictive ROEs, the fire support solution is inappropriate. Fire support still tends to be fairly indiscriminate. Technology will help improve this shortcoming, but technology also has limitations.

The concept of SEAD needs expansion. The firepower solution is a small part of suppressive fires. Indirect fires are very effective against known, accurate targets. Ground maneuver units can also provide effective suppressive fires, especially against suspected targets. Units using direct fire are not encumbered by targeting problems, and "clearance" comes quickly or is already granted. Ground maneuver units are extremely adept at suppressing most weapon systems which pose the main threat to helicopters,.

Air maneuver units must also allocate significant organic, direct fire resources to instantly suppress weapons

such as machine guns. If a helicopter force uses this option, it needs a great deal of assets to support by fire. Attack helicopters are extremely vulnerable to machine guns and AAA unless there are significant numbers of aircraft achieving a numerical advantage that overloads a gunners ability to fire accurately.<sup>7</sup> Helicopter technology, such as improved acquisition systems, improve these ratios, but a clever enemy can still hide its guns.

SEAD also involves avoidance. Avoidance comes from a flexible plan and accurate intelligence. Units gain this intelligence usually through reconnaissance. Avoidance may be the only tactically feasible SEAD option if some event curbs suppressive fires, such as low ammunition supply rates, or restrictive ROES. Technology also helps in avoidance by providing pilots with early warning. Technology enable pilots to fly low over the ground, even in low visibility conditions, thus reducing the effect of enemy weapons.

Suppressive fires also include non-lethal means. If the machine gun/all arms defense is the biggest killer, the use of smoke comes to mind. Smoke is a dual edged sword and must be used judiciously. As radars get more sophisticated, Army air maneuver forces may not be able to use the relative safety of flying low in the ground clutter. In the future, air maneuver units may mimic the USAF by using dedicated electronic warfare platforms for SEAD.



In conclusion, the U.S Army needs to expand its definition of SEAD to include all suppressive fires and avoidance. The Army needs to clearly codify the definition of air maneuver, and define how air maneuver fits into the ground battle. With an expanded definition of SEAD, and clear vision of air maneuver, the U.S. Army should clarify SEAD doctrine.

#### Recommendations for Further Study

1. The organizational structure of an air maneuver unit may need review. Once air maneuver requirements are codified, current organization structures may be obsolete.
2. Review the value of certain specialized artillery rounds, such as using chaff or flare rounds to suppress air defense systems.
3. Review the impact of a division-wide liaison and advisor command and control system for air maneuver.
4. Test and train for a new, integrated system for mutual air-ground support at the Combat Training Centers.

#### ENDNOTES

<sup>1</sup>Ken Guest, "Dragon Slayers" Defence Helicopter World, (June-July 1990), 47.

<sup>2</sup>Guess, "Dragon Slayers" 47.

<sup>3</sup>Andrew V. Barber, ARI Research Note 91-06: Short Range Air Defense (SHORAD) Engagement Performance Criteria Development and Validation, (Fort Bliss, TX: U.S. Army Research Institution, Ft. Bliss Field Unit, 1990), 28.

<sup>4</sup>Scott R. McMichael, "Urgent Fury: Looking Back and Looking Forward" Field Artillery Journal, (March-April 1985), 11.

<sup>5</sup>Jonathan M. House, Towards Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization, (Ft. Leavenworth, KS: U.S. Army Command and General Staff College, 1984), 25.

<sup>6</sup>House, Towards Combined Arms Warfare, 75.

<sup>7</sup>Barber, ARI Note 91-06, 30.

**APPENDIX A**  
**ILLUSTRATIONS**

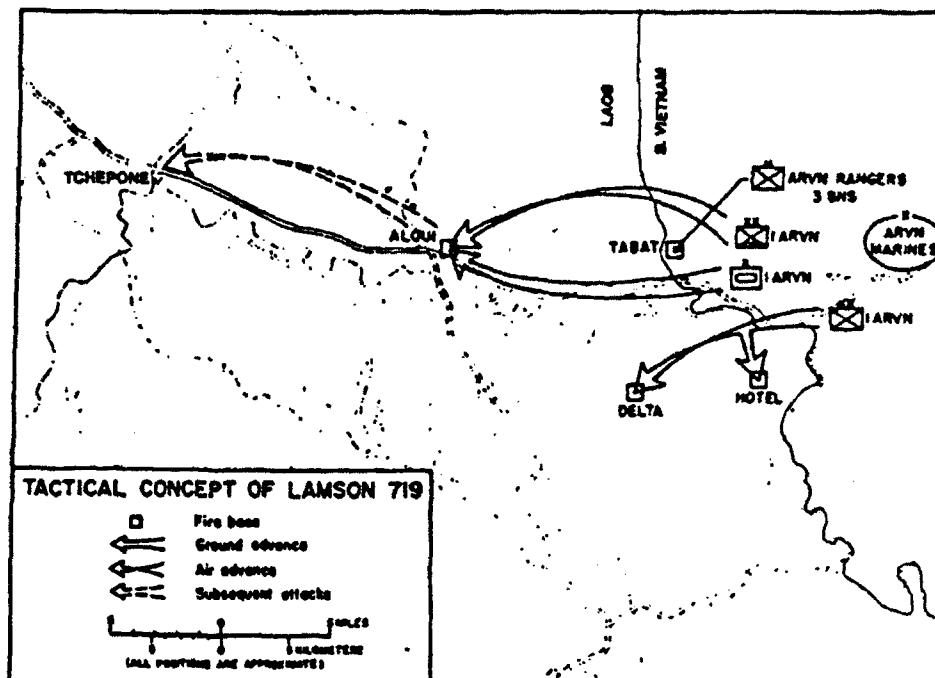


Figure 1. Lam San 719: The Plan. (From Vietnam Studies: Airmobility 1961-1971 by John J. Tolson, Washington, D.C., Department of the Army, 1973).

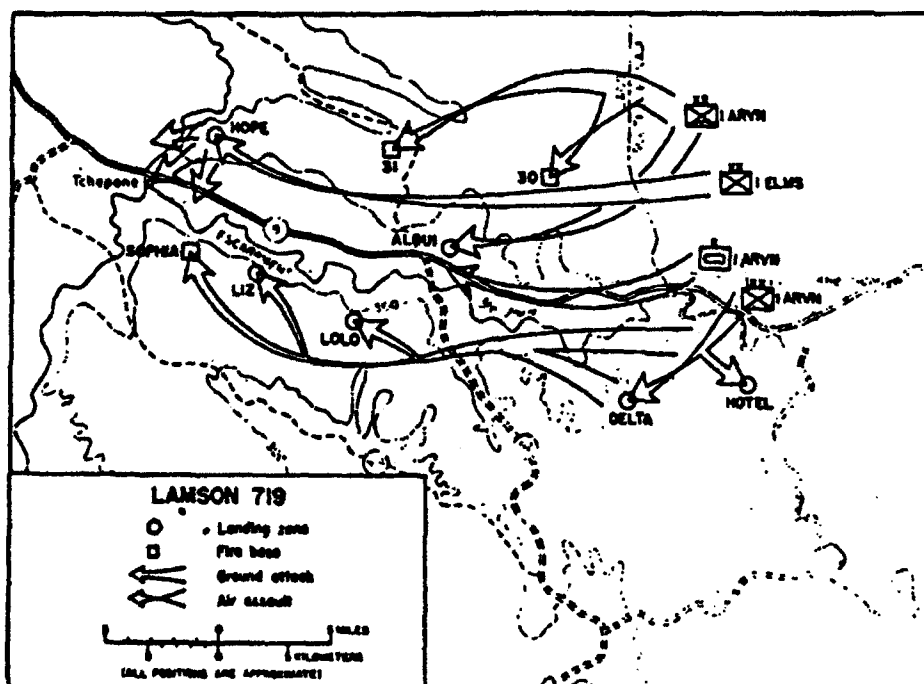


Figure 2. Lam San 719: The Operation. (From Vietnam Studies: Airmobility 1961-1971 by John J. Tolson, Washington, D.C., Department of the Army, 1973).

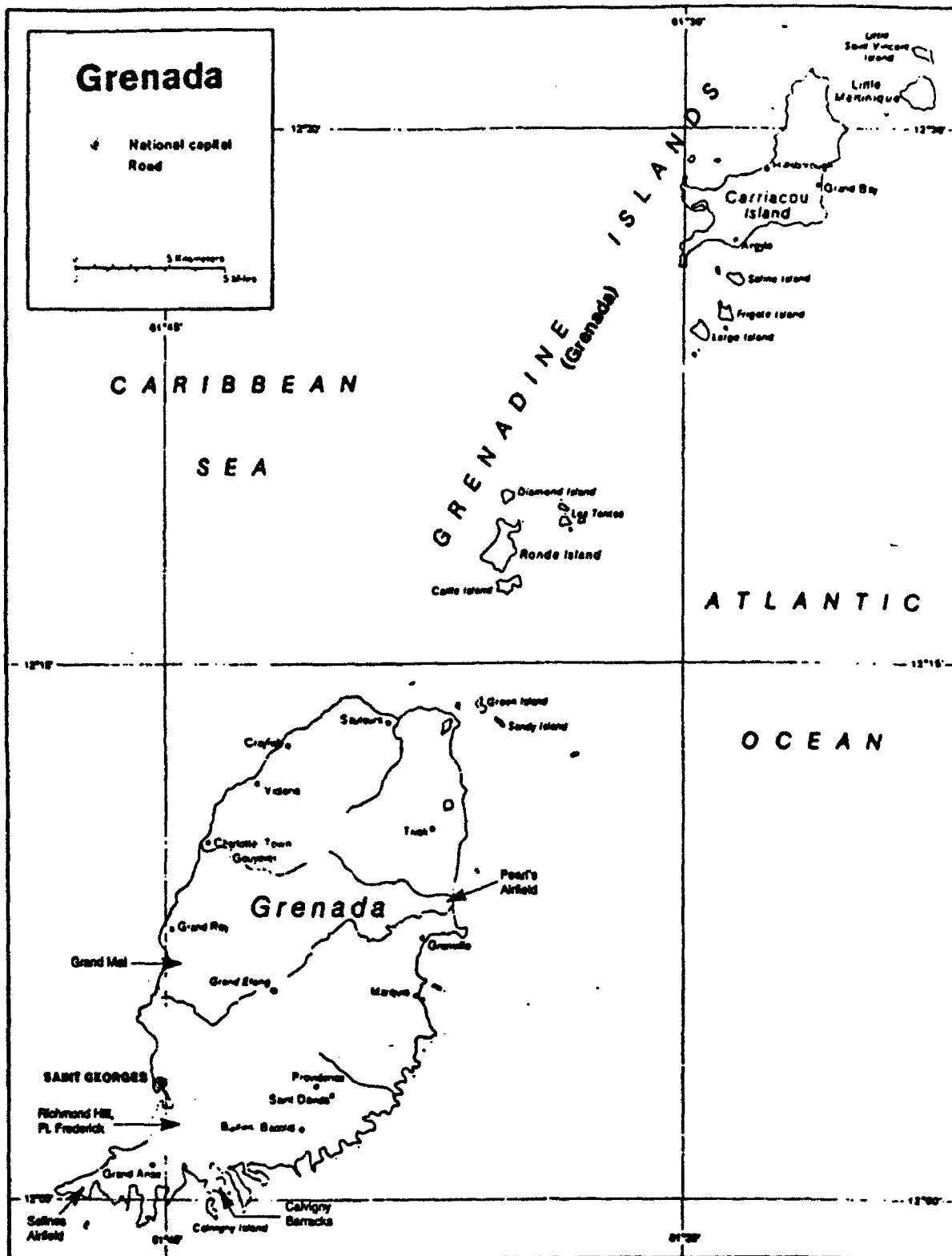


Figure 3. Map of Grenada (From *Lessons of Grenada*, Department of State Publication 9457 Washington, D.C., released Feb. 1986).

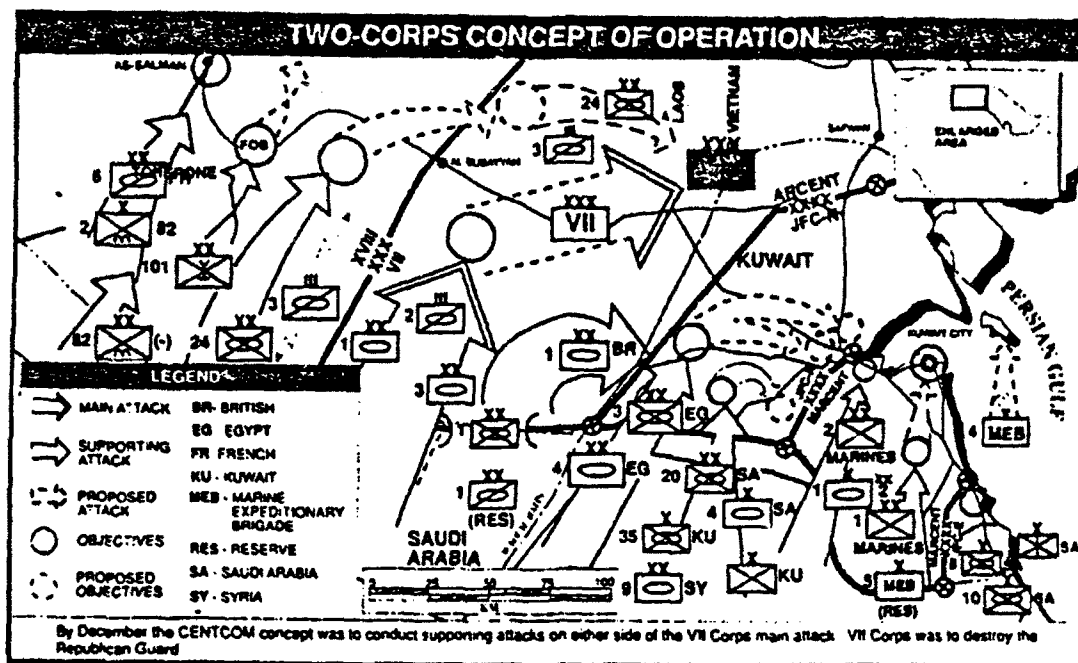


Figure 4. Two-Corps Concept Of Operation. (From *Certain Victory: The U.S. Army in the Gulf War* by Robert H. Scales, Washington, D.C., Office of the Chief of Staff, United States Army, 1993).

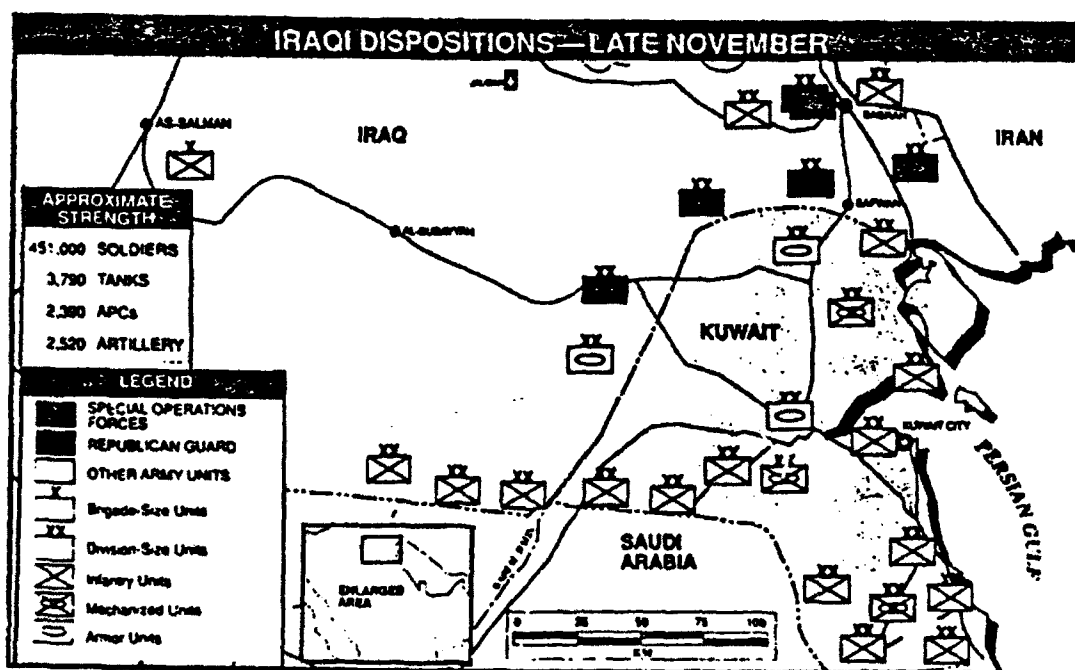
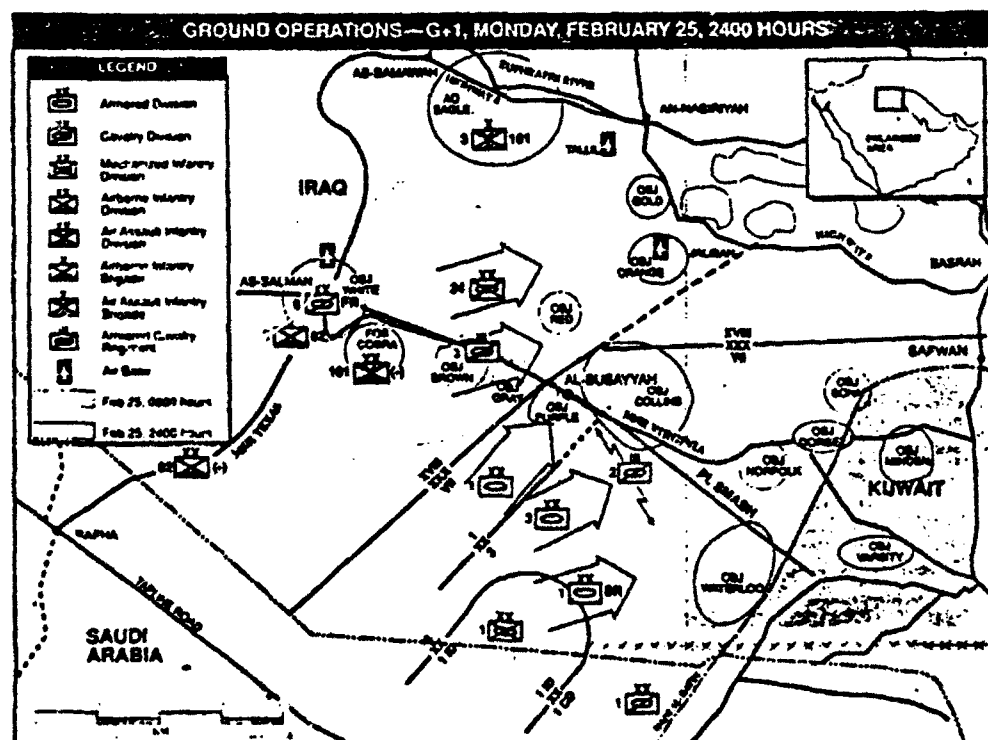
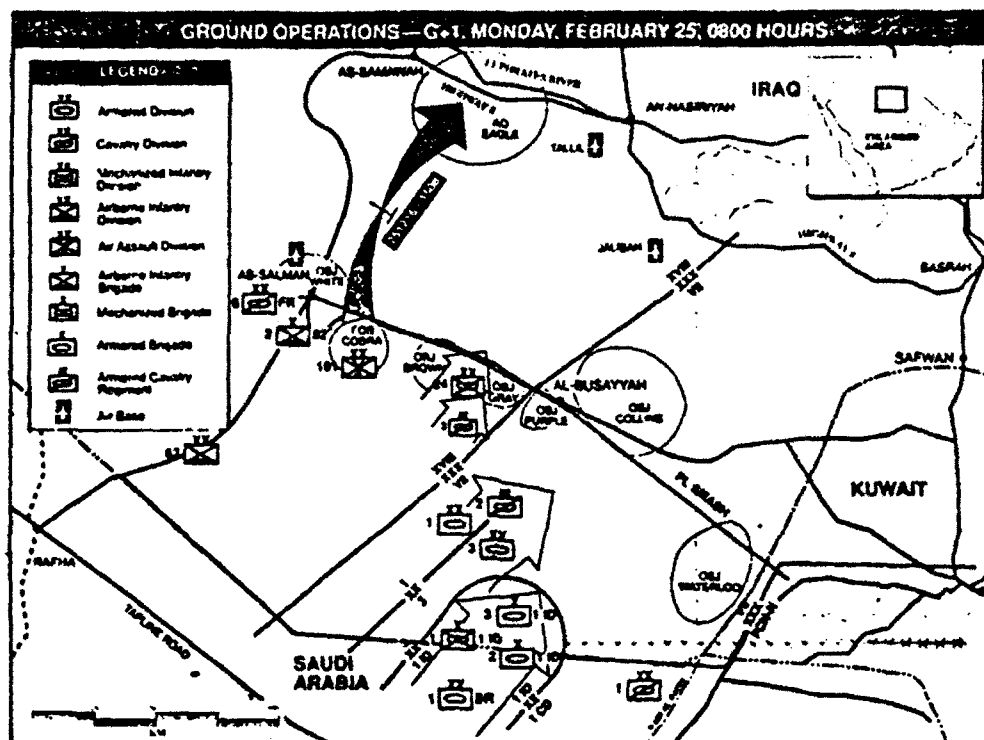
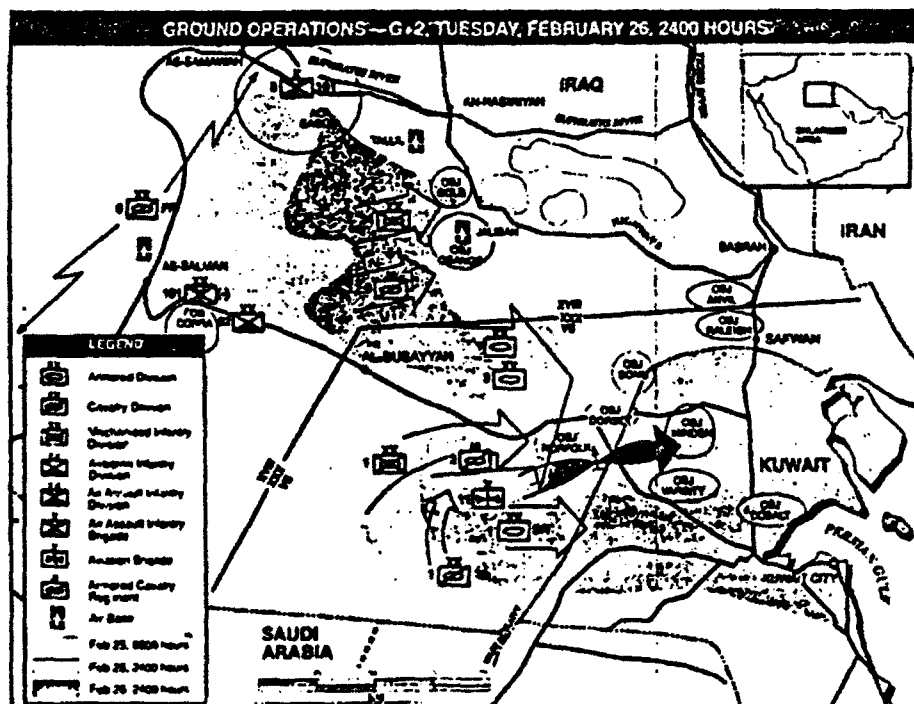
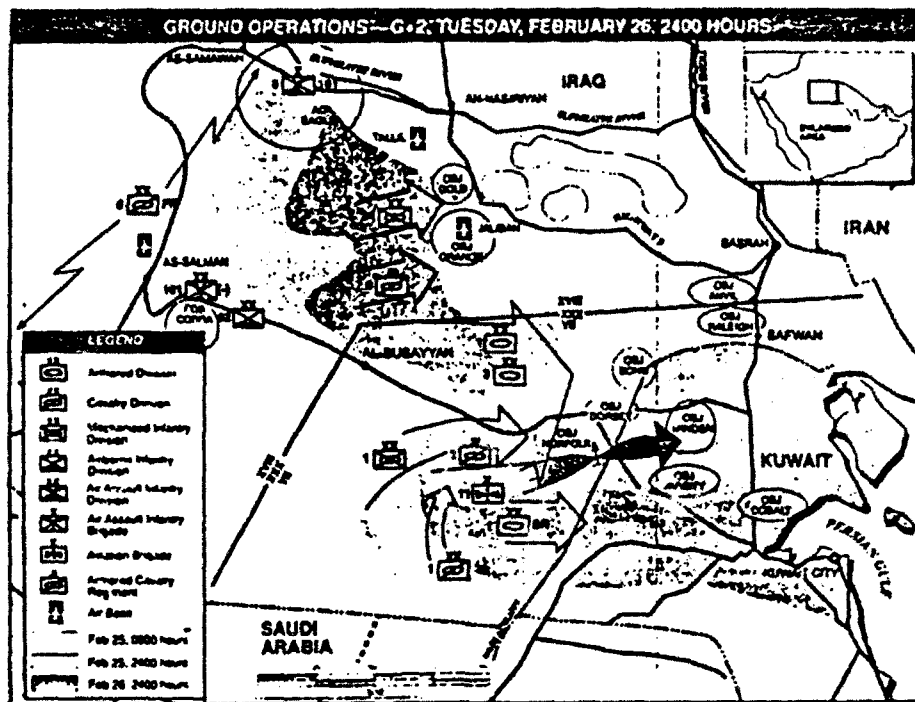


Figure 5. Iraqi Dispositions—Late November. (From *Certain Victory: The U.S. Army in the Gulf War* by Robert H. Scales, Washington, D.C., Office of the Chief of Staff, United States Army, 1993).







APPENDIX B  
CHRONOLOGY OF OPERATION DESERT STORM

Aug. 2, 1990 Iraq invades Kuwait.

Aug. 6, 1990 Saudi Arabia asks for U.S. assistance to counter threats by Iraq. President Bush sends troops to Saudi Arabia.

Aug. 8, 1990 First U.S. units arrive in the Gulf.

Nov. 8, 1990 President Bush orders 200,000 more troops to the Gulf.

Dec. 1, 1990 XVIII Airborne Corps closes in theater with five Army divisions.

Dec. 6, 1991 VII (US) Corps begins to arrive in Saudi Arabia.

Jan. 17, 1991 TF Normandy destroys two radar sites. Coalition launches air attacks against Iraq. Desert Storm begins.

Jan. 23, 1991 Coalition destruction of Iraq's Strategic Air Defenses complete. Coalition now has air superiority.

Feb. 6, 1991 VII (US) Corps closes in Saudi Arabia.

Feb. 24, 1991 (Figure 6) Marines and XVIII ABN ground attacks begin at 0400. 101 ABN establishes FOB Cobra, begins deep maneuver toward Highway 8. 5,500 prisoners taken in first 10 hours. VII (US) Corps attacks at 1430, fifteen hours ahead of schedule.

Feb. 25, 1991 (Figure 7) RGFC begins to move to blunt the attack. Coalition takes 14,000 prisoners. XVIII ABN blocks Highway 8, then attacks the Jalibah airfield. VII Corps seizes Al-Busayah, 2ACR reaches PL Smash. One AH-64 is shot down.

Feb. 26, 1991 (Figure 8) Iraq announce that its forces are leaving Kuwait. XVIII ABN continues its attack to the east. VII Corps attacks to the east with three divisions abreast. VII Corps begins to destroy RGFC forces and launches deep attacks on retreating Iraqi units.

Feb. 27, 1991 VII and XVIII Corps join together, attacking east towards Basra, destroying remaining Iraqi forces in zone. Iraqi army is in full flight. Kuwait City is liberated. One UH-60 shot down.

Feb. 28, 1991 Cease fire announced, one UH-1 lost in the early morning.

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